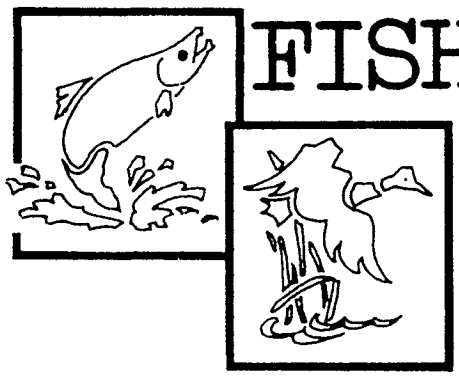
CENTRAL VALLEY FISH AND WILDLIFE MANAGEMENT STUDY



Fishing Access at Major Water Project Facilities in the Central Valley, California

SPECIAL REPORT
April 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

CENTRAL VALLEY FISH AND WILDLIFE MANAGEMENT STUDY

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THIS REPORT WAS PREPARED PURSUANT TO FEDERAL RECLAMATION LAWS (ACT OF JUNE 17, 1902, 32 STAT. 388 AND ACTS AMENDATORY THEREOF OR SUPPLEMENTARY THERETO). PUBLICATION OF THE FINDINGS AND CONCLUSIONS HEREIN SHOULD NOT BE CONSTRUED AS REPRESENTING EITHER THE APPROVAL OR DISAPPROVAL OF THE SECRETARY OF THE INTERIOR. THE PURPOSE OF THIS REPORT IS TO PROVIDE INFORMATION FOR FURTHER CONSIDERATION BY THE BUREAU OF RECLAMATION, THE SECRETARY OF THE INTERIOR, AND OTHERS.

SPECIAL REPORT
April 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
MID-PACIFIC REGION • SACRAMENTO, CALIFORNIA

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SUMMARY

In a comprehensive fish and wildlife management framework, the role of the fisherman is significant. The purpose of this study was to evaluate the need for additional fishing access at existing major water project facilities in the Central Valley Basin and develop appropriate courses of action.

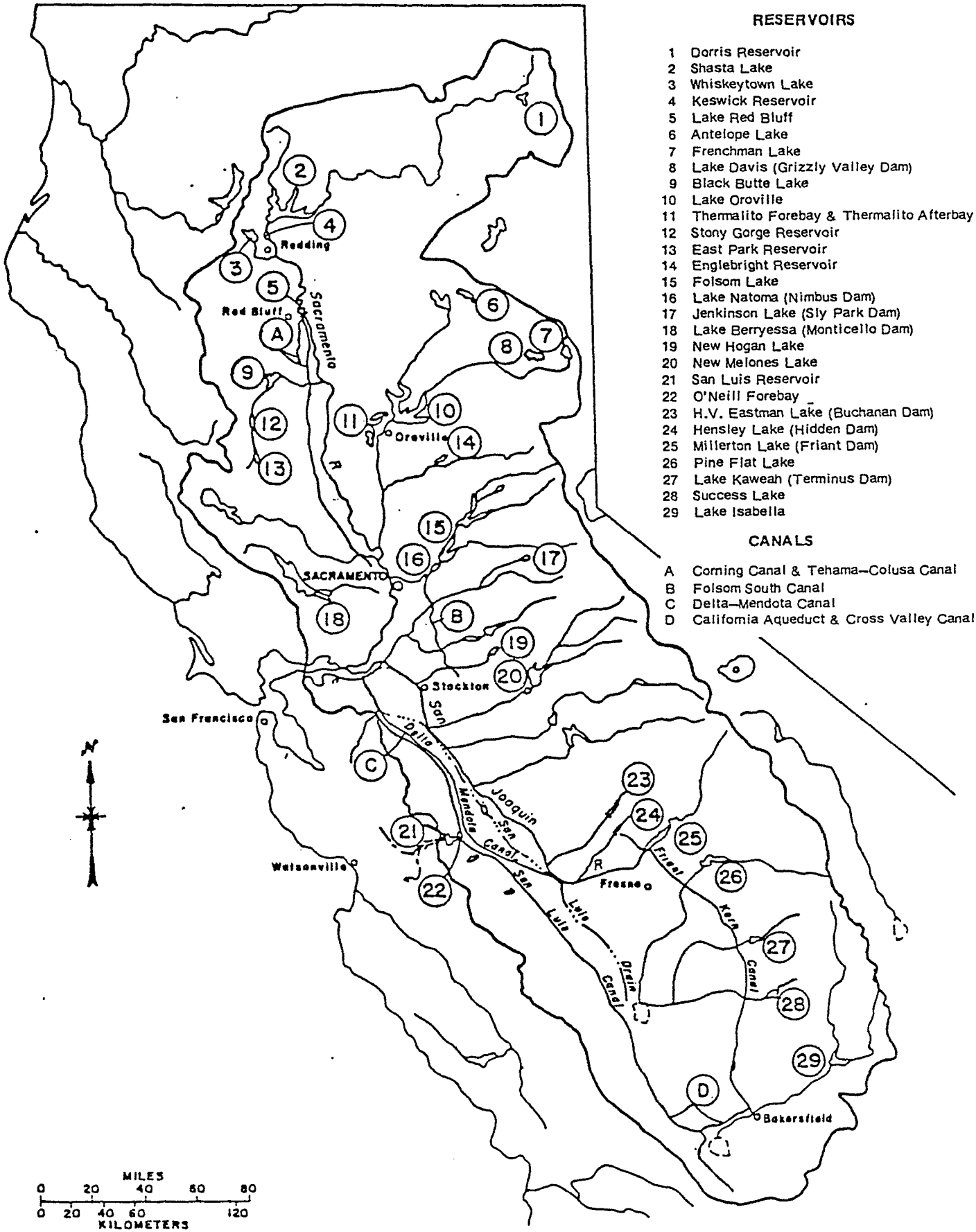
Thirty reservoirs, their associated streams, and six canals in the Central Valley Hydrologic Basin were reviewed to determine present and future adequacy of fishing access. The facilities include all major projects within the hydrologic basin which are owned and operated by the Federal Government or the State of California. These projects provide recreation and serve major population centers ranging from Redding in the north to Los Angeles in the south (figure 1).

The study process began with a comprehensive inventory of current access opportunities at targeted projects. The current and future demands for fishing were then estimated and compared with the relative capacities of these available sites in order to determine the need for modifications and additions.

A significant portion of acquired data and strategic information was accumulated through dialog and correspondence with representatives of involved public agencies. Throughout the period of study, opportunities were provided for input and advice which were utilized in the decision-making process.

Fishing access to water project reservoirs is currently quite good. However, projected future demands would indicate that certain facilities and access areas will require improvements or additions in order to provide quality experiences for anglers. Of the 30 reservoirs studied, no current or anticipated access problems were found at 6, minor problems were noted at 4, and major future problems were identified at 20 reservoirs. Access to reservoir headwater and tailwater streams ranges from fair to excellent. Due to subdivision and development, access to some streams is in danger of being lost.

Canals are an underutilized angling resource. Legal access opportunities are minimal. Hundreds of miles of canal shoreline present an angling resource which could be developed.



LOCATION MAP

Major Central Valley Reservoirs and Canals

FIGURE 1

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PART I

INTRODUCTION

PURPOSE AND SCOPE

This report presents the results of an investigation performed to evaluate the need for additional fishing access opportunities at existing major water project facilities within the Central Valley Basin, and to determine appropriate actions. Lakes, reservoirs, canals, and streams entering into (headwater) or discharging from (tailwater) reservoirs are included.

The main objectives of the study were:

1. To estimate angler demand, now and in the future, for fishing access to areas impacted by water project development.

2. To determine deficiencies of existing access and support facilities utilized by anglers. These facilities include, where information was available, sanitation, handicapped access, and fish cleaning stations.

3. To determine what modifications at existing sites are desirable.

4. To identify potential new fishing access sites wherever deficiencies cannot be eliminated through improvement of existing sites.

5. To determine actions required regarding improvement and development of fishing access areas to meet projected future needs.

CRITERIA FOR SELECTION OF STUDY PROJECTS

Initially, all Central Valley reservoirs were placed in one of the following four groupings:

Group	Category
1	Reservoirs owned and operated by the Bureau of Reclamation
2	Reservoirs owned and operated by other Federal agencies
3	Reservoirs owned and operated by the State of California
4	Reservoirs owned and operated by all other parties, both public and private

A list of reservoirs in each of the above categories is provided in appendix A. Due to time and manpower restrictions, only the first three groups were investigated as part of this study. Of these, reservoirs identified by the U.S. Fish and Wildlife Service (FWS) as having marginal fisheries or those covering less than 500 surface acres at full pool, were not investigated. A total of 30 reservoir areas were eventually selected for study.

Headwater and tailwater streams connected with study projects have been altered in a variety of ways. Some of these alterations have improved conditions considerably for stream fisheries while some have caused fishery deterioration. Because these impacts are directly attributable to project construction, major streams entering and exiting study reservoirs also were reviewed. The stream distances studied vary, but include at least those waters which are within project boundaries. Where information was available, longer river reaches were evaluated.

Water project impacts extend not only to reservoirs and related streams, but also to canal systems constructed to distribute water throughout the valley. The six canals investigated in this study are those which have been identified by the California Department of Fish and

Game (DFG) as having viable fisheries and receiving significant use, some of which could be illegal. The canals are: the Delta-Mendota, California Aqueduct, Corning, Tehama-Colusa, Cross Valley, and Folsom South.

These six canals potentially could provide many hundreds of miles of access to water. Only two, the Delta-Mendota Canal and the California Aqueduct, have established fishing access sites. Currently, no formal access is available on the Corning, Tehama-Colusa, Cross Valley, or Folsom South Canals, although unsanctioned use does occur.

In this study the observations of DFG local biologists and wardens have been used to develop a set of preliminary actions required. Because of the great distances involved and severe time limitations, these actions, which were not field checked, represent the determinations of field personnel.

DFG officials were asked to submit evaluations of access potential based on three criteria:

1. Status of fish populations
2. Existing angling pressure
3. Nearness to population centers

STUDY LIMITATIONS

To determine if existing fishing access sites will be adequate in the future, the relative capacity of each project was compared with estimates of future demand. However, since the accuracy of demand analyses (Part III) are limited due to sparse and sometimes unreliable data, adequacy of existing sites was based predominantly on a compilation

of advisory information from field personnel knowledgable about each area. The demand analyses conducted for each area served as a check on the advisory input.

Each project area was inspected, and project managers, area biologists, game wardens, and other field personnel were contacted to determine relative capacity, current limitations, and projected limitations of existing angler use facilities. A questionnaire was sent to managing agencies to assist in obtaining information (appendix B). In general, the insights and opinions of local experts, combined with field observation, were utilized to develop a set of actions designed to ensure adequate fishing access now and in the future.

Fishing occurs at a variety of recreation sites at each project area and is not just limited to designated fishing access sites. Project maps, included with the discussions of each reservoir area, locate all areas currently receiving significant use as boat launching facilities and access points for fishermen. Overnight facilities generally are not listed except where they are also used by day-use fishermen.

Three factors were important in determining whether modifications to existing sites are needed or whether new sites should be developed:

1. Resource protection,
2. Public health and safety, and
3. Angler demand.

Generally, these three factors were given equal consideration. The satisfaction of angler demand was not allowed to exceed factors that define resource integrity or public safety.

In most cases, other factors such as resource capability, esthetics, and quality of recreation experience are difficult to quantify. Consequently, in determining what action should be taken in response to a perceived demand, the use and capacity data were augmented by the observations and opinions of managers, area biologists, and other field personnel.

RELATIONSHIP TO CENTRAL VALLEY FISH AND WILDLIFE MANAGEMENT STUDY

This report is one of a series planned for the Central Valley Fish and Wildlife Management Study (CVF&WMS). The study area, shown on the frontispiece, is the Central Valley Hydrologic Basin. Objectives of the study are to:

1. Identify fish and wildlife problems and opportunities associated with water resource development, distribution, and utilization in the Central Valley.

2. Provide the basis for formulating and recommending a long-range management framework within which fish and wildlife resources can be protected and enhanced.

The overall study, initiated in fiscal year 1979, is being conducted to formulate a comprehensive framework of fish and wildlife management guidelines for the Central Valley. This is essential to resolve some of the very complex and controversial water-related fish and wildlife issues.

Water resource development and utilization within the valley are so interrelated that localized modifications of water and land and of fish and wildlife management practices often result in corresponding impacts elsewhere in the valley. Any actions such as modernization of

fish hatcheries, streamflow alterations, and modification of control structures cannot be pursued effectively without knowledge of the positive and negative impacts on beneficial uses throughout the system. The comprehensive study of existing basinwide baseline conditions is being made so that the impacts of proposals to resolve existing fish and wildlife problems or the development of new water supplies can be evaluated adequately.

Three categories of problems and opportunities are being addressed in the overall study. They are: anadromous fish, wildlife, and reservoirs and miscellaneous.

PREVIOUS INVESTIGATIONS

The issue of fishing access in the Central Valley has not been addressed specifically in any other previous or current study. Although in some cases fishing access has been mentioned in master plans for individual projects, no comprehensive studies have been conducted for evaluation of large geographical areas.

The following studies include some discussions of fishing access although it is not their prime focus.

1. Recreation Enhancement

   Bureau of Reclamation, Total Water Management Study of the Central Valley Basin, California (Working Document Number 11), 1976

2. Sacramento River Study

   Department of Water Resources, 1981

3. Delta Outdoor Recreation Survey

   E. Z. Cajucam Ph.D., and Associates

   For the State of California, Department of Water Resources, 1980

4. The User's Guide to PARIS

   Park and Recreation Information Service

   Department of Parks and Recreation, 1978

5. California Outdoor Recreation Resources Plan 1974

   Department of Parks and Recreation, 1974

6. Bulletin No. 117 Series, Recreation and Fish and Wildlife Programs for the State Water Project, Department of Water Resources, 1965-74

RELATED CURRENT ACTIVITIES

This report was prepared under the study category "Reservoirs and Miscellaneous." It identifies the need for the evaluation of fishing access opportunities at existing major Central Valley water project facilities. A related study conducted concurrently, entitled "Fishery Management Problems at Major Central Valley Reservoirs, California," is to formulate a program to optimize production of sport fish in major reservoirs in the Central Valley.

Also of interest is a related CVF&WMS study entitled, "A Concept for Resolving Wildlife Habitat, Recreation Access, and Crop Damage Problems, Sacramento River Riparian Zone, California." This study is being conducted to appraise the possibility of land acquisition as a solution to these problems.

PUBLIC INVOLVEMENT

Formal public survey was not a tool used for public input in this report. However, during field surveys of project sites, numerous informal contacts with anglers were made. People were asked to give their thoughts on: favorite fishing spots, ancillary facilities viewed as necessary, access problems, acceptable use densities, future access needs, and any other fishing-related topics they wished to discuss. In this manner, insight was gained concerning public sentiment on the issue of access adequacy at individual projects. More detailed user surveys could serve, among other purposes, to illustrate the wishes of the fishing public.

Documented public input for this study is a result of phone conversations, correspondence, and meetings with representatives of resource management agencies concerned about the issue of fishing access. Project managers were given opportunities to discuss fishing access needs, present and future, and to express their thoughts concerning access requirements to meet future demand. Preliminary contacts were established by telephone calls and a questionnaire sent to all managing offices (appendix B). Following onsite review in the company of each manager, meetings were held to obtain information. Decisions concerning study actions placed great importance on the information accummulated in this manner.

Also contributing information were biologists and wardens from the California Department of Fish and Game. Details collected by phone and mail provided valuable information on fish populations, site use, and public desires. Their help was especially valuable in evaluating canal

and stream needs and much of what is contained in the report is a reflection of their perceptions.

Major contributors of data and information are listed in table 1.

Table 1. Agencies consulted

Bureau of Reclamation

- Project Field Offices
  - Berryessa
  - Willows (East Park, Stony Gorge, Red Bluff)
  - Tracy (New Melones)
- Public Affairs Office, Shasta Dam
- Land, Recreation, and Wildlife Section, Sacramento

California Department of Fish and Game

- Central Valley Fish and Wildlife Management Study Liaison
- Wildlife Conservation Board
- Area Biologists
  - Region One, Redding
  - Region Two, Sacramento
  - Region Four, Fresno

California Department of Parks and Recreation

- Parks and Recreation Information Service, Sacramento
- Project Field Offices
  - San Luis/O'Neill
  - Oroville/Thermalito Forebay and Afterbay
  - Millerton
  - Folsom/Natoma

California Department of Water Resources

- Red Bluff Office

El Dorado Irrigation District

- Jenkinson Lake Field Office

National Park Service

- Whiskeytown Field Office

Table 1. Agencies consulted (Continued)

U.S. Army Corps of Engineers

- Planning Division, Sacramento
- Real Estate Office, Sacramento
- Project Field Offices
  - Black Butte
  - Buchanan
  - Englebright
  - Hensley
  - Isabella
  - Kaweah
  - New Hogan
  - Pine Flat
  - Success

U.S. Fish and Wildlife Service

- Modoc National Wildlife Refuge

U.S. Forest Service

- Shasta Lake Field Office
- Plumas National Forest Recreation Office

PART II

SETTING

THE CENTRAL VALLEY

The area covered by the Central Valley Fish and Wildlife Management Study is composed of the Central Valley Hydrologic Basin formed by two major river basins, the Sacramento on the north and the San Joaquin on the south. The combined basin is nearly 500 miles long and about 120 miles wide. It contains 38 million acres of land, more than one-third of the area of California. Nearly one-third of the basin area is valley floor, where the bulk of the population, industry, and agriculture is located. The foothills and mountains in the two-thirds of the basin surrounding the valley floor receive most of the precipitation and provide the main source of the water supply for the valley. The summers are hot and usually rainless.

Most of the precipitation occurs in the winter. The water supply of the Central Valley is derived chiefly from snowmelt from the Sierra Nevada to the east, with minor amounts of runoff from the Coast Range mountains to the west, and from precipitation on the valley floor. Runoff varies widely from year to year and from season to season, being highest in the winter and spring, and low in the summer and fall months. Many streams in the area are intermittent, with flow only during wet periods of the year.

Water development in the basin spans a period of more than 120 years. Basically, it progressed through four stages. In the first stage, local diversions were made directly from the rivers. The second stage was the widespread use of ground-water pumping adjacent to rivers.

In the third, water was stored for use within a river basin. In all of these stages, the water facilities were constructed and operated by individuals, companies, districts, or other water service organizations.

Large-scale Federal water development in the Central Valley began in 1935 with the initial phases of construction of the Central Valley Project by the Bureau of Reclamation. This inaugurated the fourth stage and marked the beginning of coordinated interbasin water development in the Central Valley. In 1961, construction began on the California State Water Project, including joint Federal and State facilities. The primary source of water for the two projects is the Sacramento River Basin, although some water is derived from the San Joaquin Valley to the south, and some is imported from the Trinity River to the west.

The Central Valley Project is composed of a series of storage facilities, conveyance systems, and powerplants constructed, under construction, or proposed, to make multipurpose use of the water supplies that can be controlled by the facilities. The project reservoirs are coordinated in their operation to make maximum use of the available water supply. They provide irrigation, flood control, municipal and industrial water supply, recreation, and power generation.

A summary description of major reservoir features located in the Central Valley Basin is contained in table 2.

Specific factors having direct impact on the present and future demand for fishing access include fish and wildlife, urbanization, and recreation. They are discussed in the following sections.

Canals can also provide tremendous fishing opportunities and are largely underutilized.

Table 2. Major features of study reservoirs

Reservoir (name of dam if different from reservoir)	Dam operator	Recreation manager	County	Gross pool elevation (feet)	Storage (acre-feet)	Surface area (acres)	Inflow	Outflow	Closest population centers	Vegetation
East Park Reservoir	USBR	USBR	Colusa	1200	50,900	1,820	Stony Creek	Stony Creek	Willows Ukiah	blue oak digger pine
Folsom Lake	USBR	California Parks & Recreation	Sacramento El Dorado Placer	466	1,010,300	11,450	American River	Lake Natoma	Sacramento	blue oak digger pine
Jenkinson Lake (Sly Park Dam)	USBR	El Dorado Irrigation District	El Dorado	3471	41,000	640	Angel Creek	Sly Park Creek	Sacramento Placerville	sierran yellow pine
Keswick Reservoir	USBR	Shasta County	Shasta	587	23,800	640	Shasta	Sacramento River	Redding	northern yellow pine
Lake Berryessa (Monticello Dam)	USBR	USBR	Napa	440	1,602,300	20,700	Putah Creek Pope Creek	Putah Creek	Sacramento Bay area	blue oak digger pine
Lake Natoma (Nimbus Dam)	USBR	California Parks & Recreation	Sacramento	125.5	9,030	540	Folsom Lake	American River Folsom South Canal	Sacramento	riparian forest
Lake Red Bluff	USBR	USBR	Tehama	257	6,753	530	Sacramento River	Tehama-Colusa Canal	Red Bluff	riparian forest
Millerton Lake (Friant Dam)	USBR	California Parks & Recreation	Madera Fresno	578	520,500	4,900	San Joaquin River	San Joaquin River	Madera Fresno	blue oak digger pine
New Melones Lake	USBR	USBR	Calaveras Tuolumne	1088	2,419,500	12,500	Stanislaus River	Lake Tulloch	Sonora Modesto	blue oak digger pine
Shasta Lake	USBR	USFS	Shasta	1067	4,552,000	29,500	Sacramento River, Pit River, Squaw Creek, McCloud River	Keswick	Redding	northern yellow pine sierran montane, blue oak, digger pine
Stony Gorge Reservoir	USBR	USBR	Glenn	841	50,000	1,275	Stony Creek	Stony Creek	Willows	blue oak, digger pine

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Table 2. Major features of study reservoirs (continued)

Reservoir (name of dam if different from reservoir)	Dam operator	Recreation manager	County	Gross pool elevation (feet)	Storage (acre-feet)	Surface area (acres)	Inflow	Outflow	Closest population centers	Vegetation
Whiskeytown Lake	USBR	USPS	Shasta	1210	241,000	3,250	Whiskey Creek Crystal Creek	Clear Creek	Redding	northern yellow pine
Black Butte Lake	CE	CE	Tehama Glenn	474	160,000	4,560	Stony Creek	Stony Creek	Orland	blue oak digger pine
Dorris Reservoir	USPS	USPS	Modoc	-	-	1,060	Canal	-	Alturas	Sierran montane
Englebright Reservoir	CE	CE	Nevada Yuba	527	70,000	815	Yuba River	Yuba River	Marysville	blue oak digger pine
H. V. Eastman Lake (Buchanan Dam)	CE	CE	Madera	587	150,000	1,780	Chowchilla River	Chowchilla River	Mariposa Merced Madera	blue oak digger pine
Hensley Lake (Hidden Dam)	CE	CE	Madera	540	90,000	1,570	Fresno River	Fresno River	Madera	blue oak digger pine
Lake Isabella	CE	CE	Kern	2606	570,000	11,400	Kern River	Kern River	Bakersfield	California prairie
Lake Kaweah (Terminus Dam)	CE	CE	Tulare	694	150,000	1,945	Kaweah River	Kaweah River	Visalia	blue oak digger pine
New Hogan Lake	CE	CE	Calaveras	713	323,000	4,410	Calaveras River	Calaveras River	Stockton Lodi	blue oak digger pine
Pine Flat Lake	CE	CE	Fresno	952	1,000,000	5,970	Kings River Big Creek Dinkey Creek	Kings River	Fresno	blue oak digger pine
Success Lake	CE	CE	Tulare	653	85,440	2,406	Tule River	Tule River	Porterville Tulare	blue oak digger pine
Antelope Lake	California DWR	USPS	Plumas	5002	22,566	890	Indian Creek	Indian Creek	Susanville	yellow pine shrub

Table 2. Major features of study reservoirs (continued)

Reservoir (name of dam if different from reservoir)	Dam operator	Recreation manager	County	Gross pool elevation (feet)	Storage (acre-feet)	Surface area (acres)	Inflow	Outflow	Closest population centers	Vegetation
Frenchman Lake	California DWR	USFS	Plumas	5588	55,477	1,470	Little Last Chance Creek	Little Last Chance Creek	Reno	yellow pine shrub
Lake Davis (Grizzly Valley Dam)	California DWR	USFS	Plumas	5775	84,371	4,000	Big Creek Grizzly Creek	Big Creek Grizzly Creek	Quincy	Sierran montane
Lake Oroville	California DWR	California Parks and Recreation	Butte	900	3,538,000	15,500	Feather River	Feather River Thermalito Forebay	Oroville Paradise Chico	blue oak digger pine Sierran montane yellow pine chapparal
O'Neill Forebay	California DWR	California Parks & Recreation	Merced	225	56,400	2,250	San Luis & Delta-Mendota Canals	San Luis & Delta-Mendota Canals	Los Banos	California prairie
San Luis Reservoir	California DWR	California Parks & Recreation	Merced	544	2,041,000	12,700	O'Neill Forebay	O'Neill Forebay	Los Banos	California prairie
Thermalito Afterbay	California DWR	California DWR and DFG	Butte	137	57,000	4,550	Thermalito Forebay	Feather River	Oroville Paradise Chico	California prairie
Thermalito Forebay	California DWR	California Parks and Recreation	Butte	224	14,400	600	Lake Oroville	Thermalito Afterbay	Oroville Paradise Chico	blue oak digger pine

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FISH AND WILDLIFE

The Sacramento River system presently contributes about 90 percent of the Sacramento-San Joaquin Delta outflow; the San Joaquin River and Delta tributaries contribute about 10 percent. The major water projects, Central Valley Project (CVP) and State Water Project (SWP), export large amounts of water to the San Joaquin Valley and the SWP exports water to inland and coastal basins south of the Tehachapi Mountains. In the absence of the CVP and SWP, much of the San Joaquin Valley could not have been converted from native habitat to croplands. Once cultivated, the lands are of very low value to resident wildlife and only low to moderate value to migratory birds. Irrigation return flows are increasing the level of salts in San Joaquin Valley waters. In contrast, the Sacramento Valley has good quality water in relative abundance and its developed agricultural lands support far more wildlife resources than the San Joaquin Valley on a unit basis, especially resident wildlife. Different soil and crop types are the primary reasons. (CVP reauthorization)

Reservoirs have become one of the major fish habitats in the Sacramento-San Joaquin system. The nature of each reservoir and its fish fauna is determined by its elevation, size, location, and water quality. In general, reservoirs are less productive per surface area than are lakes because their deep, steep-sloped basins and fluctuating water levels greatly limit habitat diversity. The reservoirs range from clear, oligotrophic, cold-water lakes at high elevations to turbid, eutrophic, warm-water impoundments at low elevations. Most of the reservoirs, and the largest, lie at mid-elevations in the foothills and have characteristics of both warm-water and cold-water impoundments.

The mid-elevation reservoirs support a mixture of native fishes that lived in the streams prior to the construction of the dams and exotic fishes that were introduced by man. In many cases the native forms, particularly hardhead and squawfish, have become uncommon after an initial period of abundance. However, in a few reservoirs hitch or tui chubs, often initially introduced by man as forage for game fish, have become the most abundant species. Normally a variety of exotic species dominate the fish fauna. The exact species composition in each reservoir varies with the history of the introductions, but some species are now almost universal in their occurrence: bluegill, largemouth bass, smallmouth bass, carp, Sacramento squawfish, Sacramento sucker, threadfin shad, golden shiner, black crappie, brown bullhead, and rainbow trout (hatchery strains). Further discussion of mid-elevation reservoir fisheries is contained in Appendix C.

At connecting points where bodies of water meet canals, fish migrate or are sucked into the canals from their original locations. In some cases, they bypass fish diversion systems designed to keep them out. Some spawning does occur in canals but regeneration mainly occurs through fish passage.

Intentional or not, fish of many species do quite well in canals which are not regularly chemically treated or emptied of water. Black bass, green sunfish, several varieties of catfish, striped bass, crappie, and a variety of rough fishes are common. Some starry flounder, trout, and salmon also occur in isolated stretches.

Portions of canals drained for maintenance purposes have revealed huge quantities of fish. In 1962, a 70-mile section of the Delta-Mendota

Canal was found to contain over 50 tons of fish. Recently, biologists have speculated that some short reaches of the San Luis Canal may contain a concentration of fish equivalent to 50 tons of fish per mile! In many cases, although population figures have not been established, strong fisheries are known to exist. Such fisheries consist primarily of black bass, several varieties of catfish, striped bass and crappie, and nongame fish such as carp, squawfish, and suckers.

URBANIZATION

Although irrigated areas are considerably larger than urban ones, large urban areas do exist within the basin, and most of the population is concentrated in these metropolitan complexes. Sacramento is the largest, followed by Fresno, Stockton, Bakersfield, and Modesto. Other growing towns and cities include Redding, Chico, Marysville, Yuba City, Merced, Madera, and Visalia. The 1972 basin population of 3.1 million is projected to double by 2020, with an associated need for change in use of water supplies and land. (CVP Reauthorization)

RECREATION

Central Valley recreation is closely connected to natural and developed water resources. Fishing, swimming, boating, water skiing, camping, rafting, tubing, hiking, sightseeing and waterfowl hunting are extremely popular, occurring near or on lakes, rivers, and reservoirs. Other nonwater-based activities also pursued include horseback riding, photography, off-road vehicle use, jogging, upland game hunting, and target shooting.

Recreationists come mainly from population centers in the valley itself but also from coastal areas, especially the San Francisco Bay area. Because of weather patterns, these people recreate most heavily from early spring to mid-fall. Winter recreation is considerably lighter, notable exceptions being fishermen pursuing winter run anadromous fish.

PART III

PROBLEMS AND NEEDS

GENERAL

An expanding population will place greater demands on currently existing fishing access opportunities. That same expansion will also produce land use competition which may curtail access which is not protected. As pressure increases for alternative land uses, traditionally used access over previously unwanted lands may become imperiled.

In some cases, access opportunity is already receiving maximum use or even moderate overuse. Even without future loss of land to developers, access in these areas will not meet future demand. If provision is not made for increased pressure, and potential sites are not identified, opportunities for access may not be available as the need increases.

In keeping with National Economic Development objectives, the problems outlined here imply a need to improve the efficiency of resource use, expand the economic resource base, and improve the quality of life through recreation. Increased access opportunities to meet increasing demand are of direct value to project users.

Provision of access to fishing waters involves environmental quality tradeoffs. The need exists to evaluate environmental impact with and without additional access opportunities. Access development could improve certain environmental quality factors but degrade others. It must be determined, in view of demand, what actions will help meet that demand with minimal negative impact on the resource.

Since angling is a passive and usually dispersed recreational activity, it is generally not considered to be conducive to large, highly developed access areas. Also, the areas surrounding most of the water project facilities in the Central Valley basin consist of relatively small land bases so that the development of several large access areas could result in severe impacts to the existing riparian zones. Impacts could occur through increased erosion, increased localized traffic on existing rural roads, and further degradation to the already limited riparian vegetation at project facilities.

In areas surrounding the Sacramento River, shore access is extremely limited by the presence of vegetation, levees, and riprap. This precludes the establishment of access facilities without substantial alteration to the surrounding landscape. Preservation and enhancement of the existing riparian vegetation areas would result in the improvement of the fishing resources of the Sacramento and San Joaquin Rivers over the long term.

The above limitations point out a need for increased opportunity to access bank space in a more dispersed manner, thereby reducing negative impacts on both the riparian habitat and the quality of the recreational activity.

DETERMINATION OF ANGLER DEMAND

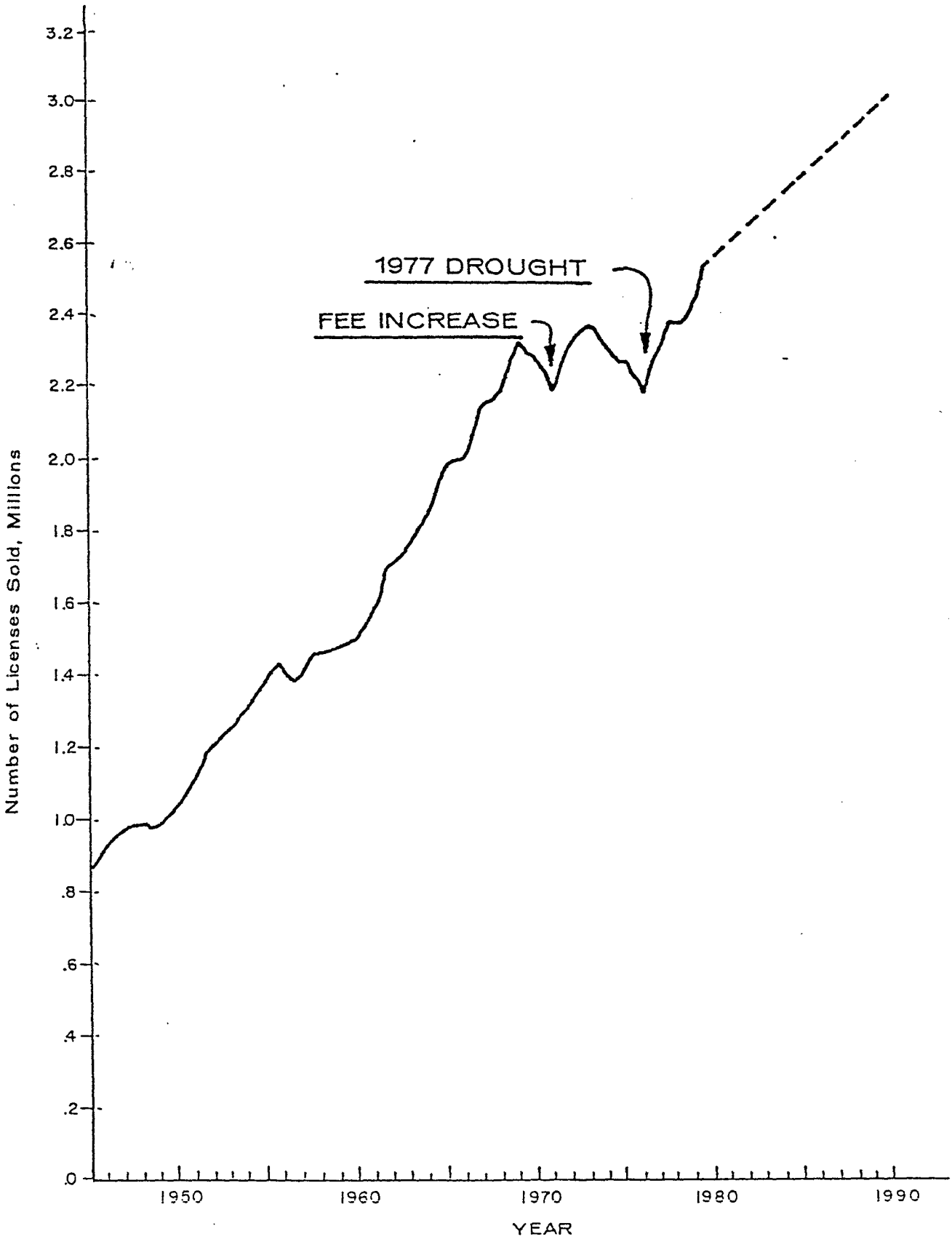
Quantifying angler demand in the selected study areas was difficult. Detailed demand studies were lacking; managing agencies often were utilizing outdated information. The energy crisis and the resultant rise in gasoline prices also have decreased the accuracy of earlier demand estimates.

However, it appears certain that the demand for fishing opportunities will continue to increase as it has in the recent past. According to DFG records, fishing license sales have increased consistently for the last several years, as shown on figure 2.

Projections by the DFG show 11.1 percent of the public will purchase fishing licenses through the 1980's. Using Department of Finance population estimates and applying the fishing license rate of 11.1 percent, approximately 440,000 more licenses will be sold in 1990 than were sold in 1980 (see figure 2). The number of anglers in age groups not requiring licenses will also be expected to increase. This greater number of anglers will require additional sites for fishing.

In 1960 (the most recent information available), the California Department of Parks and Recreation Information Service (PARIS) projected, for each county, the demand for fishing for the years 1980 and 1990. These estimates were expressed as "potential demand" which is a simple statement of the desire and ability, both physically and financially, of people to participate in recreation activities. They are totally independent of available facilities or project carrying capacities. The methods and technical aspects used by the Department of Parks and Recreation are explained in PARIS, 1966.

To determine future angler use at most of the project areas, the percent increase in demand from 1980 to 1990, as projected for each county by PARIS, was applied to current angler use rates at each lake. The results appear in table 3. The assumption is made that a linear relationship between fishing and total visitation will be maintained



FISHING LICENSE SALES

FIGURE 2

during the next 10 years and that projected angler use for a particular reservoir area will reflect increases in demand for fishing in the county within which it lies. It does not take into account the attraction factor of new facilities or angling quality which may influence angler use at each reservoir area. At some of the projects, where data were available, use statistics projected by managing agencies were utilized in place of projected demand data. Obviously, there are limitations to this procedure for estimating demand, many of which will be discussed later in this report.

Table 3. Estimated angler day demand by study area through 1990

Study area	County	Angler participation days* estimated for county by PARIS 1980	1990	Increase in participation days (%)	Total visitation at project in 1980	Total visitation at project in 1990	Angler day demand 1980	Angler day demand 1990
Antelope Lake	Plumas	996,000	1,341,000	35	134,000	189,000	9,471	12,785
Black Butte Lake	Tehama	1,786,000	2,393,000	34	198,000	235,000	45,540	54,050
Dorris Reservoir	Modoc	868,000	1,173,000	35				
East Park Reservoir	Colusa	532,000	709,000	33	20,000	26,600	2,400	3,192
Englebright Reservoir	Yuba	354,000	472,000	33	235,000	265,000	37,600	42,400
	Nevada							
Folsom Lake	Placer	3,176,000	4,215,000	33	1,900,000	2,527,000	75,000	99,750
	El Dorado							
	Sacramento							
Frenchman Lake	Plumas	996,000	1,341,000	35	170,000	229,500	72,797	98,276
H.V. Eastman Lake	Madera	1,223,000	1,614,000	32	206,000	219,000	206,000	219,000
Hensley Lake	Madera	1,223,000	1,614,000	32	390,000	450,000		
Jenkinson Lake	El Dorado	978,000	1,301,000	33	171,000	227,430	30,000	39,900
Keswick Reservoir	Shasta	1,061,000	1,430,000	35	12,000	16,200	4,400	5,940
Lake Berryessa	Napa	365,000	482,000	32	1,100,000	1,452,000	130,000	171,600
Lake Davis	Plumas	996,000	1,341,000	35	200,000	271,000	78,980	106,623
Lake Isabella	Kern	2,924,000	3,844,000	31	900,000	1,300,000	738,000	966,780
Lake Kaweah	Tulare	2,992,000	3,956,000	32	395,000	485,000	150,100	184,300
Lake Natoma	Sacramento	1,324,000	1,750,000	32	425,000	529,000	95,000	125,400
Lake Oroville	Butte	689,000	923,000	34				
Lake Red Bluff	Tehama	1,097,000	1,470,000	34	130,000	172,900	10,500	14,070
Millerton Lake	Madera	4,842,000	6,389,000	32	1,050,000	1,386,000	26,000	34,320
	Fresno							
New Hogan Lake	Calaveras	550,000	730,000	33	305,000	370,000	85,400	103,600
New Melones Lake	Calaveras	1,703,000	2,271,000	33		1,044,000		104,400
	Tuolumne							
O'Neill Forebay	Merced	1,146,000	1,520,000	33	350,000	465,000	58,000	77,140
Pine Flat Lake	Fresno	3,619,000	4,775,000	32	672,000	773,000	100,800	115,950
San Luis Reservoir	Merced	1,146,000	1,520,000	33	400,000	532,000	300,000	399,000
Shasta Lake	Shasta	1,061,000	1,430,000	35	2,300,000	3,105,000	190,000	256,500
Stony Gorge Reservoir	Glenn	614,000	820,000	34	31,000	41,230	5,000	6,700
Success Lake	Tulare	2,992,000	3,956,000	32	705,000	865,000	296,100	363,300
Thermalito Afterbay	Butte	689,000	923,000	34				
Thermalito Forebay	Butte	689,000	923,000	34	876,200	1,168,850	52,572	70,131
Whiskeytown Lake	Shasta	1,061,000	1,430,000	35	1,400,000	1,890,000	112,000	151,200

*Angler Participation Days = A day (24 hours) or any portion of a day in which an individual participates in angling.

PART IV

ANALYSES

RESERVOIR AREAS

In this part, the current and future access opportunities are discussed for each of the 30 reservoirs and associated streams. Problems are identified and potential solutions are presented. The sections dealing with projects for which conceptual site plans have been developed contain additional, more detailed information.

The reservoirs are:

*Includes conceptual site plan
**Other conceptual plans developed in Department of Water Resources Bulletin 117 Series.

Major features of the canals studied are discussed in a separate section beginning on page 146.

ANTELOPE LAKE, FRENCHMAN LAKE, AND LAKE DAVIS (GRIZZLY VALLEY DAM)

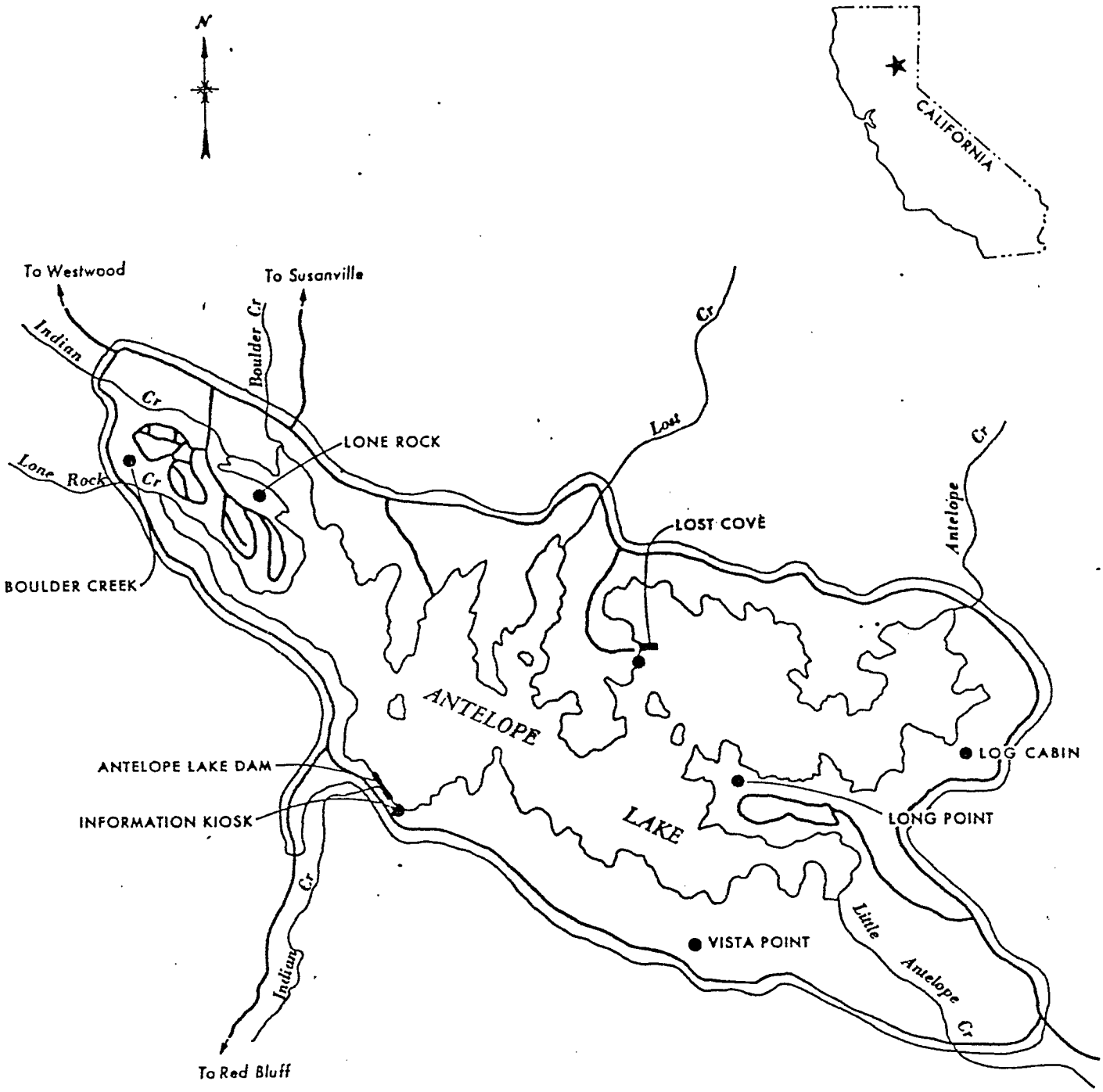
Antelope Lake, Frenchman Lake, and Lake Davis (figures 3, 4 and 5, respectively) are treated together here due to their proximity and their common management by the U.S. Forest Service. The Forest Service is confident that access to these three projects will be adequate through the 80's and probably some time after that. Facilities are in good shape and use levels generally range from low to moderate. Shore fishing for day-users, as well as campers, is readily available with good parking and sanitation facilities.

Boat ramps are in good shape and sufficient to meet demand at Antelope and Frenchman Lakes. Lake Davis is in need of a ramp at the Camp Five area, but plans have been made by California Department of Boating and Waterways to fill that need.

Handicapped anglers in this area can utilize a courtesy dock at Mallard Cove on Lake Davis. It has been adapted for wheelchair use and provides a safe, convenient opportunity for the handicapped.

All three reservoirs are generally surrounded by National Forest land, so headwater and tailwater streams can be accessed for some distance via Forest Service roads. Also, each reservoir is ringed by county and Forest Service roads by which all streams entering and leaving can be accessed at crossings.

Best opportunities for stream fishing connected with these reservoirs are in Indian Creek below Antelope Lake Dam and in Little Last Chance Creek below Frenchman Lake Dam. Indian Creek flows for over 10 miles before leaving Forest Service land and is paralleled by a road from the spillway



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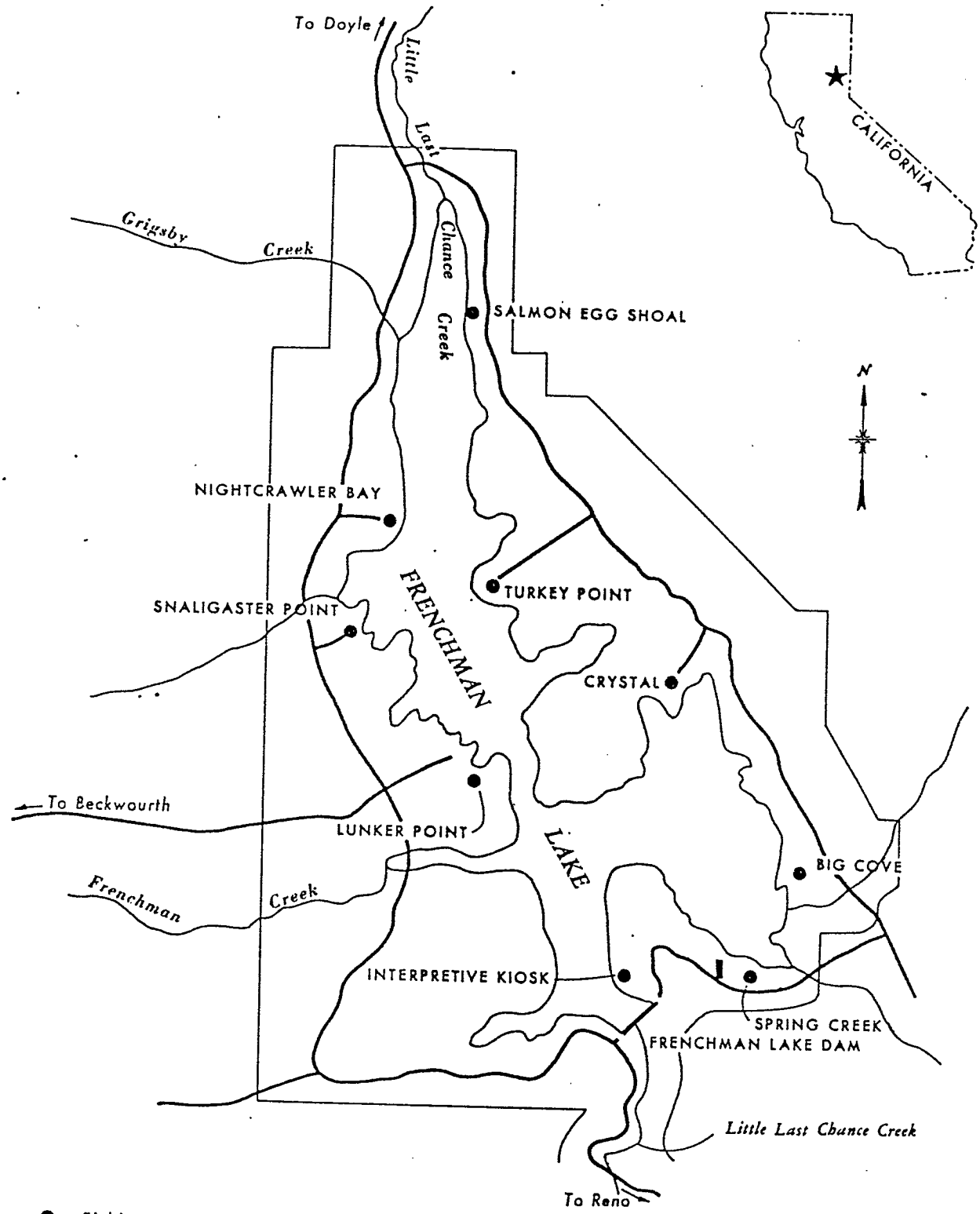
ANTELOPE LAKE

FIGURE 3



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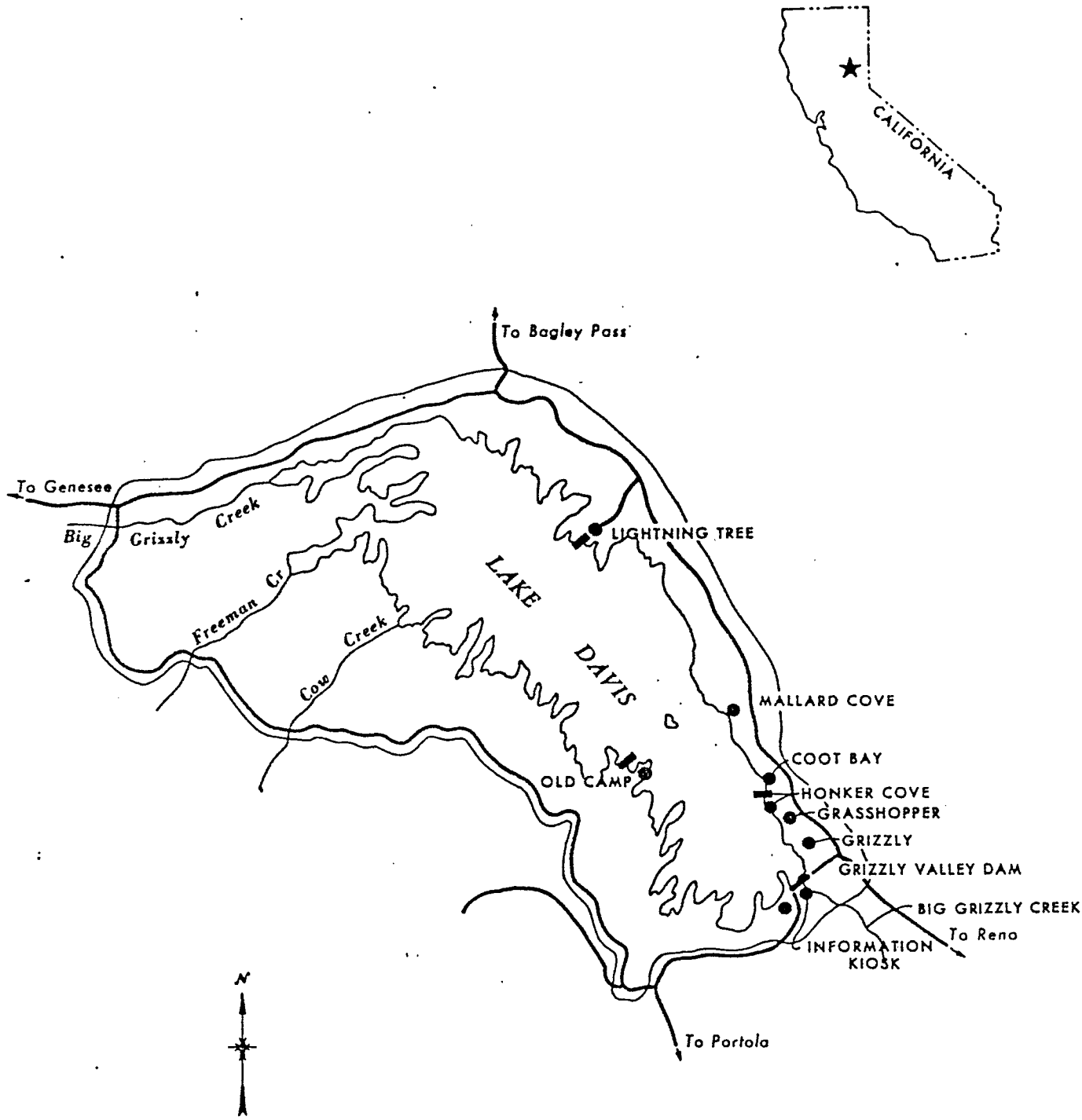
FRENCHMAN LAKE

FIGURE 4



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LAKE DAVIS

FIGURE 5

on down to private land. In 1981, summer releases to Indian Creek were increased by the DWR (Department of Water Resources) to enhance the creek's fishery. Little Last Chance Creek also is paralleled by a road and remains accessible over at least 3 miles of Forest Service land.

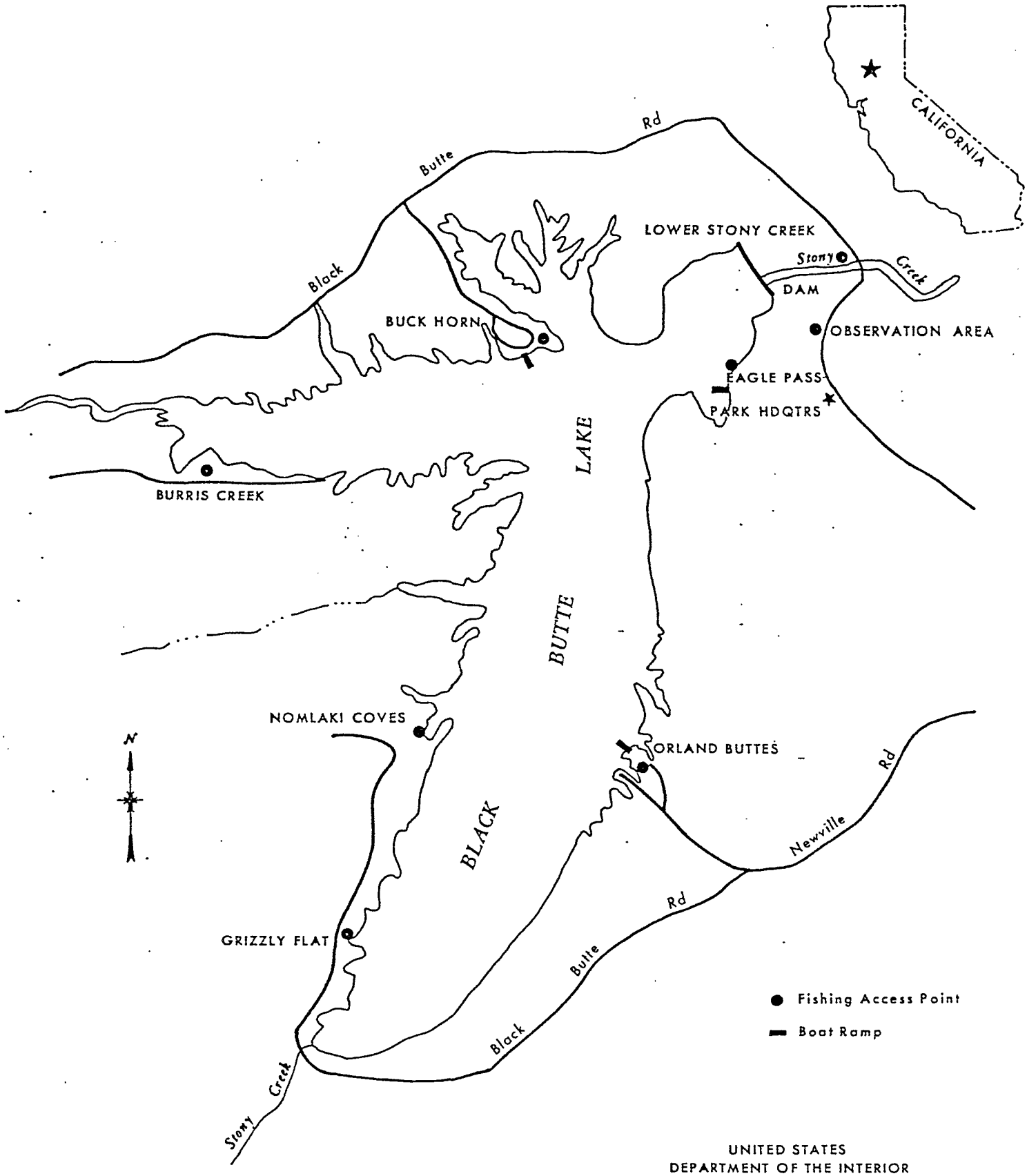
Big Grizzly Creek, below Lake Davis, can be accessed from the parking lot at the dam information kiosk. To improve access and guard against public exclusion by developers, DWR has acquired private lands adjacent to the creek from the dam downstream to the middle fork of the Feather River. In 1982, the DWR changed the summer water releases from Lake Davis to enhance the stream fishery.

BLACK BUTTE LAKE

Recreation activities, including fishing, at Black Butte Lake (figure 6), which is managed by the Corps of Engineers, have been at low to moderate levels. Access and facilities for anglers are good and capable of handling increased use. Improvements of existing access and fishing facilities, rather than additional development, will maintain the possibility of a quality experience through the 1980's. Upgrading sanitation facilities might become advisable if pressure accelerates at a particularly rapid rate over the next 10 years. However, the location, lack of shade and vegetation, and extreme summer temperatures would not favor such a trend. At projected use rates, boat ramps and shore access appear to be adequate for this decade.

Shore anglers can reach most of the lake's shoreline from five developed areas along the north and east shores, and from two undeveloped areas on the west shore. The terrain is flat, so parking is not difficult to provide. The boat ramps are scheduled for widening, but the need is not expected for many years. Until that time, the existing ramps at Orland Buttes, Buckhorn, and Eagle Pass will provide access for boat fishermen. Car-top launching is possible at Nomlaki Coves on the west shore.

The master plan provides for eventual installation of special facilities for handicapped anglers at the Lower Stony Creek access area. According to park officials, it is not likely that there is enough demand by the handicapped to warrant development of such a site at this time. No studies have been done to determine needs of handicapped anglers. If,



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BLACK BUTTE LAKE

FIGURE 6

in the near future, it becomes apparent that there is a need for such a facility, master plan implementation will solve the problem.

Stony Creek, the stream immediately below Black Butte Dam, can be reached and fished. From that point on down to the Sacramento River, the stream flows across private land.

Stony Creek supports a warm-water fishery which does not attract many anglers. The stream also can be accessed at county road crossings.

DORRIS RESERVOIR

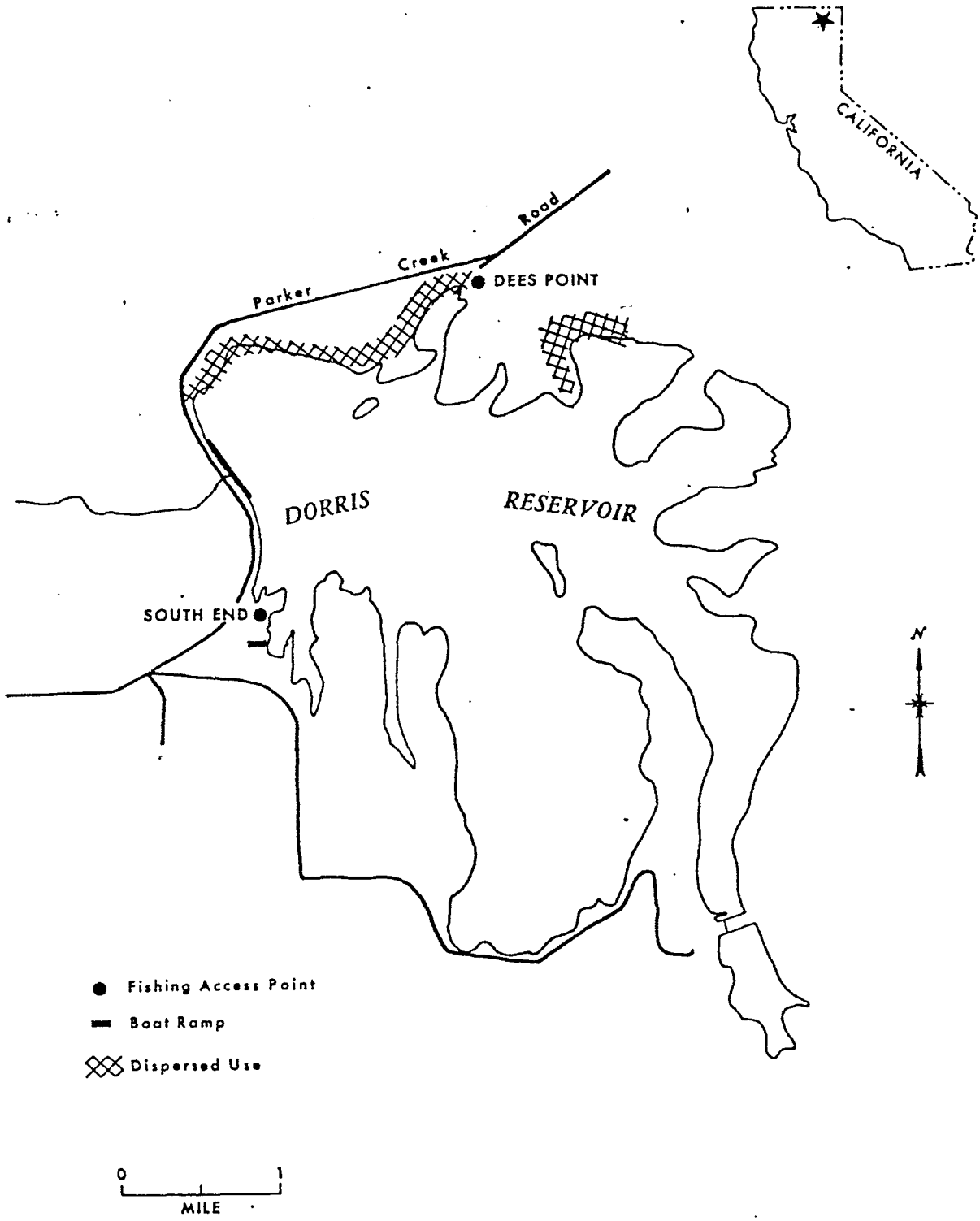
Dorris Reservoir (figure 7) is managed by USFWS as part of the Modoc Wildlife Refuge. The area is managed for recreation, but the main reason for its existence is waterfowl enhancement. Dorris Reservoir, with a maximum depth of about 20 feet, supports a warm-water fishery only. For that reason, its attraction for anglers is low to moderate, but is a popular spot for locals. Channel catfish were planted in the past, and DFG plants about 5,000 rainbow trout catchables each year. These offer additional fishing incentive. Use by anglers is mostly in the spring and is prohibited during all of the waterfowl hunting season.

Approximately 50 percent of the shoreline of Dorris is in private ownership. Most of that private land is along the east side of the lake with public ownership dominating the remaining shoreline.

The terrain surrounding Dorris is not severe, and most of the public shoreline can be reached easily by foot from the two existing access points. Boat launching is available at the ramp on the south shore, with car-top launching possible at the Dee's Point area, on the north shore. One problem that should be addressed is the condition of the launch ramp on the south shore. The concrete has crumbled and is in need of replacement. Renovation is necessary to improve safety.

Sanitation and parking facilities are adequate at both public access areas. The only facilities for the handicapped are the restrooms at Dee's Point.

Dorris Reservoir was created as a resting and propagation area for waterfowl. Geese nest on the reservoir and extensive use of it by



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DORRIS RESERVOIR

FIGURE 7

anglers would conflict with this activity. For this reason, it would not be desirable to increase access to the lake. This situation does not create a problem, however, as pressure is not heavy and is not expected to intensify significantly in this decade.

Dorris Reservoir is manmade and maintained by canal water. No major streams directly feed the project.

EAST PARK RESERVOIR, LAKE RED BLUFF, AND STONY GORGE RESERVOIR

East Park Reservoir, Lake Red Bluff, and Stony Gorge Reservoir are currently operated by the Bureau of Reclamation and managed as one unit. Current authorization allows provision for only minimum health and safety facilities; development of new recreation facilities is not possible without another agency willing to share the cost of installing additional facilities and assume responsibility for their operation and maintenance. Master plans for these areas are being developed by the Bureau of Reclamation.

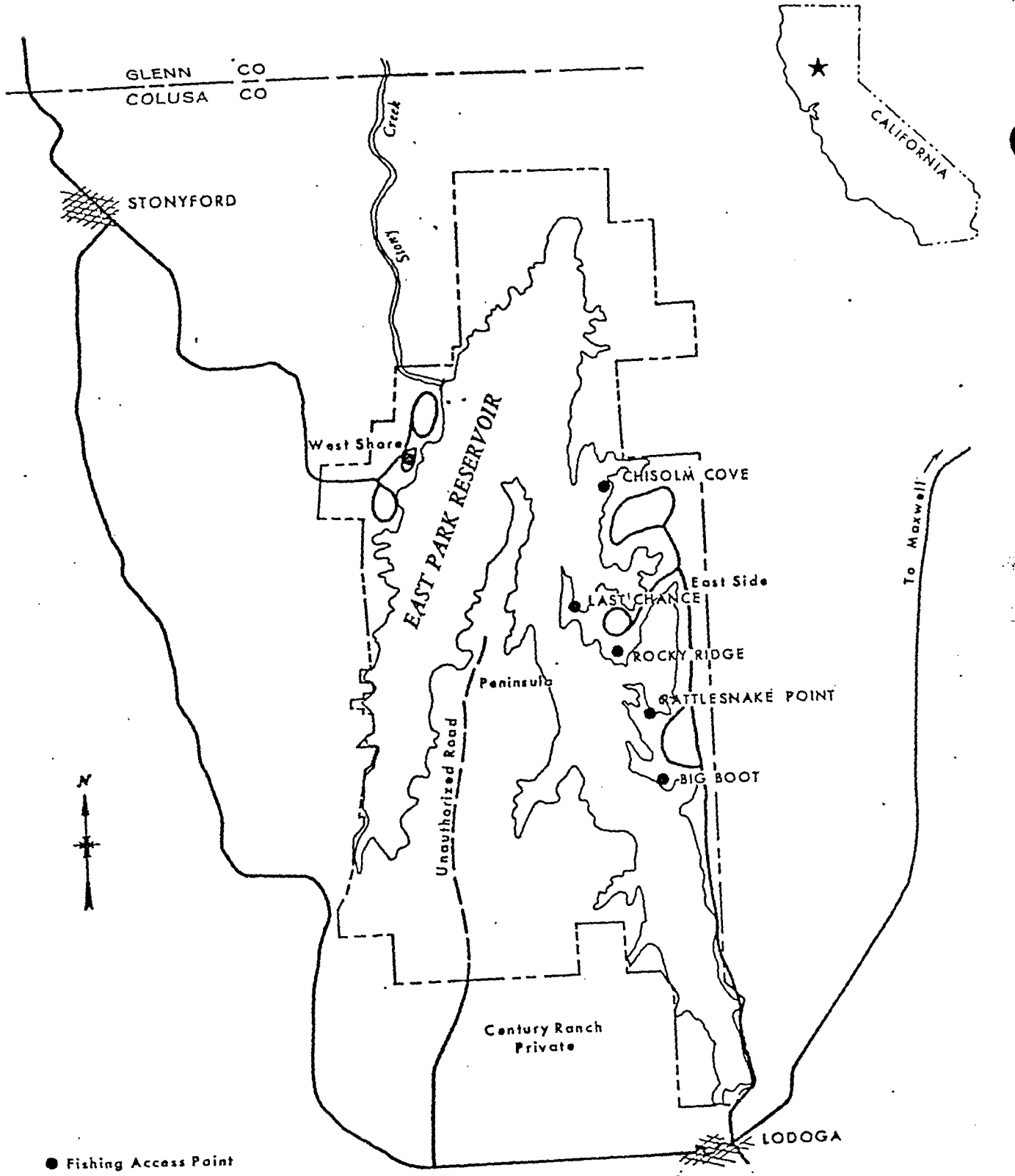
East Park Reservoir

East Park Reservoir (figure 8) currently has good fishing access from both its east and west shores. Sloping shoreline is abundant on both sides; users have no trouble finding a place to park a vehicle or trailer. Problems do exist with indiscriminate vehicular use of the areas, resulting in vegetative degradation and soil erosion. Informational signing and appropriate barriers could guide users to desirable parking areas.

Boat launching is over natural hardpan, but continuous use will eventually erode the shoreline. People launch at spots that look best to them, so use is dispersed. Concrete ramps on both sides of the reservoir would protect bank integrity and control indiscriminate use. A conceptual site plan for a west side boat launching facility is shown on figure 9. The related benefit-cost information and environmental quality impacts are summarized in tables 4 and 5, respectively. Similarly, a plan for an east side boat launching facility is shown on figure 10 and evaluated in tables 6 and 7.

The terrain is not severe; shore anglers have no problem reaching long stretches of shoreline from the east and west access areas. Portable toilets are brought in each year for the March-October recreation season. These units have been adequate thus far, but vault or saniflush units would be more desirable.

Drinking water has not been made available for this project. The feasibility of developing a ground-water well should be studied and a supply located. Extreme summer temperatures limit activity; drinking water would increase safety and comfort.



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EAST PARK RESERVOIR

FIGURE 8

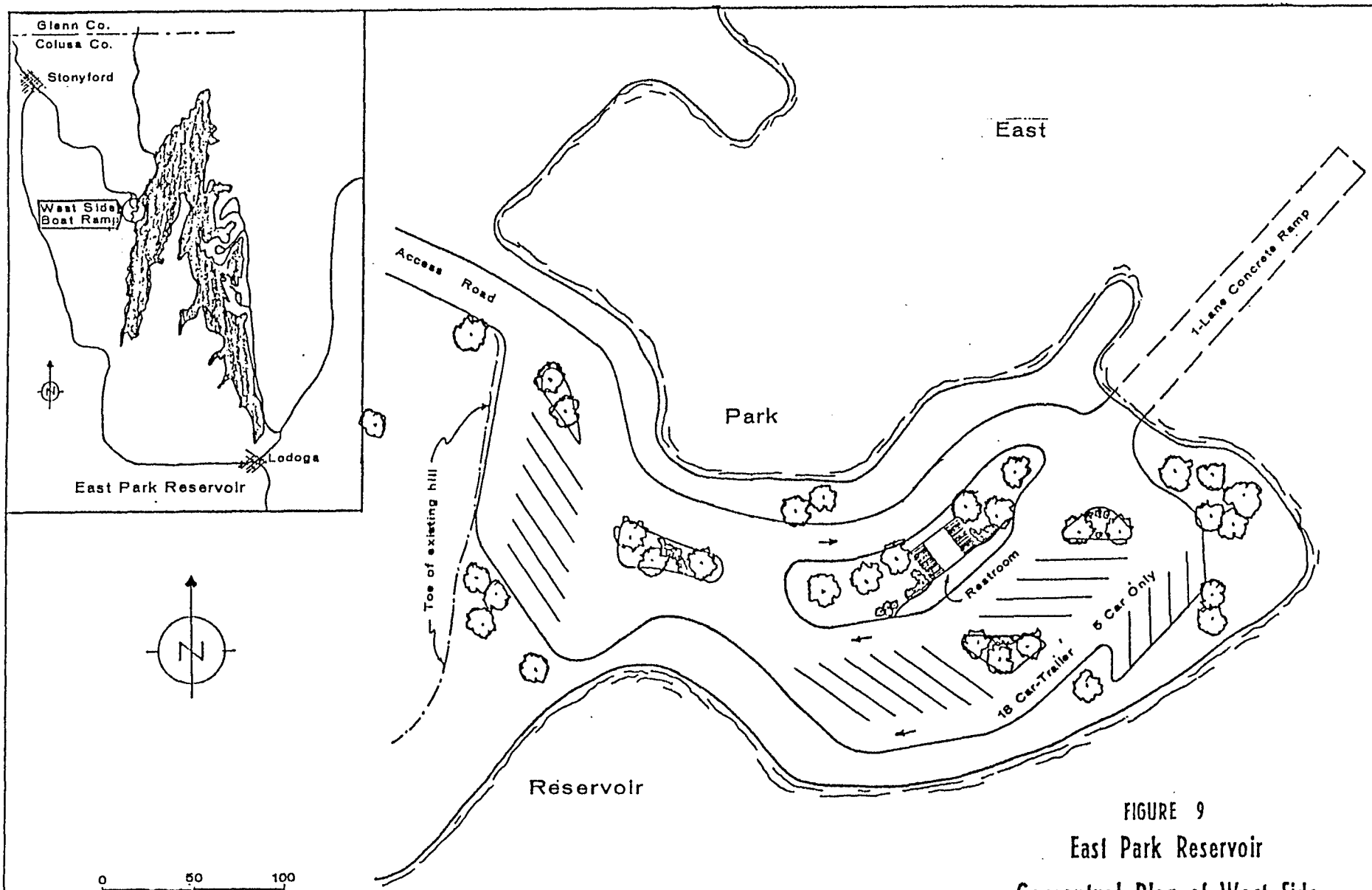

FIGURE 9

East Park Reservoir

Conceptual Plan of West Side

Boat Launching Facility

C—064642

Table 4. Benefits and costs[a/]
East Park Reservoir
west side boat launching facilities

Beneficial effects[b/]	
Direct user benefits[c/]	
Recreation	$ 28,000
Adverse effects	
Construction costs	160,000
Annual equivalent	
Federal investment	12,000
Annual operating cost	6,000
Total annual cost	18,000
Net project benefits	10,000
Benefit-cost ratio	1.6 to 1

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a/ Economic impacts were estimated using methods from Procedures for Evaluation of National Economic Development Benefits and Costs in Water Resources Planning (Level C) as outlined by the Water Resources Council. For further details concerning procedure or value criteria, see subpart K of volume 44, No. 242, of the Federal Register, December 14, 1979 (also, see Appendix D).

b/ External economies and employment of unemployed resources not identified.

c/ Annual equivalent value for 100 years at 7-3/8 percent interest.

Table 5. Environmental quality impacts, East Park Reservoir, west side boat launching facility

Environmental category	Present	Future		Effect of plan[a/]
		No plan	Plan	
Open space and greenbelts	G	F	F	A
Streams and stream systems	NA	NA	NA	0
Lakes	G	G	G	0
Beaches and shores	P	P	F	B
Wilderness, primitive, and natural areas	NA	NA	NA	0
Estuaries and wetlands	NA	NA	NA	0
Other natural beauty areas	NA	NA	NA	0
Archeological resources	NA	NA	NA	0
Historical resources	NA	NA	NA	0
Biological resources				
Flora	F	F	G	B
Fauna	F	F	G	B
Geological resources	NA	NA	NA	0
Ecological systems	G	F	G	B
Water quality	G	G	G	0
Air quality	G	G	G	0
Land quality	F	F	G	B
Sound quality	VG	G	G	A
Visual quality	G	F	G	B

[a/] Effect of plan is difference in quality between future without the project (no plan) and future with project (plan).

Quality

VP - very poor
P - poor
F - fair
G - good
VG - very good
NA - not applicable

Effect

SA - strongly adverse
A - adverse
0 - no effect
B - beneficial
SB - strongly beneficial

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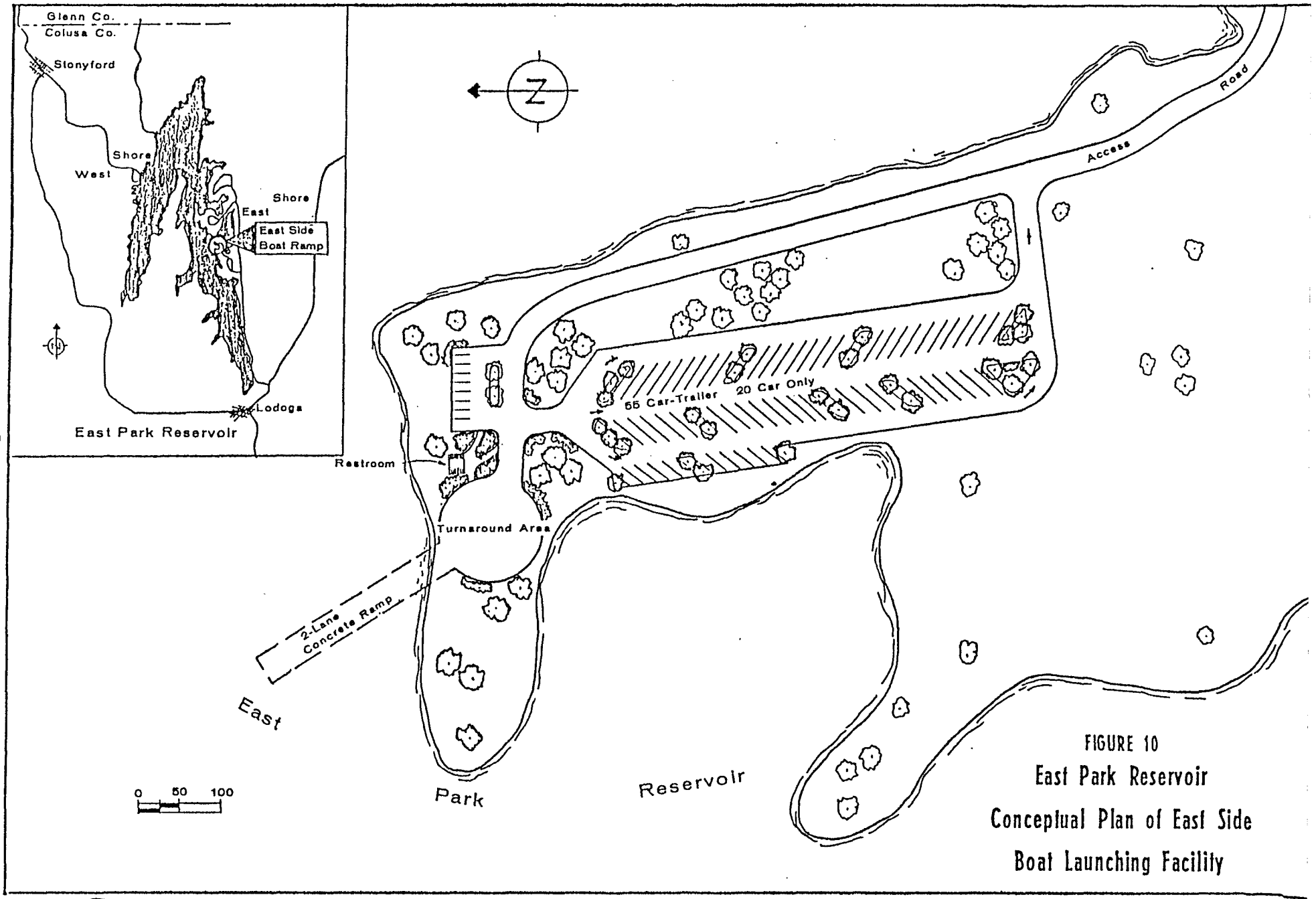

FIGURE 10

East Park Reservoir

Conceptual Plan of East Side

Boat Launching Facility

C-064645

C-064645

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Table 6. Benefits and costs
East Park Reservoir
east side boat launching facilities

Beneficial effects[a]	
Direct user benefits[b]	
Recreation	$ 91,000
Adverse effects	
Construction costs	225,000
Annual equivalent	
Federal investment	17,000
Annual operating cost	19,000
Total annual cost	36,000
Net project benefits	55,000
Benefit-cost ratio	2.5 to 1

[a] External economies and employment of unemployed resources not identified.
[b] Annual equivalent value for 100 years at 7-3/8 percent interest.

C-064646

Table 7. Environmental quality impacts, East Park Reservoir, east side boat launching facilities

Environmental category	Present	Future		Effect of plan[a]
		No plan	Plan	
Open space and greenbelts	G	F	F	A
Streams and stream systems	NA	NA	NA	0
Lakes	G	G	G	0
Beaches and shores	P	P	F	B
Wilderness, primitive, and natural areas	NA	NA	NA	0
Estuaries and wetlands	NA	NA	NA	0
Other natural beauty areas	NA	NA	NA	0
Archeological resources	NA	NA	NA	0
Historical resources	NA	NA	NA	0
Biological resources				
Flora	F	F	G	B
Fauna	G	F	G	B
Geological resources	NA	NA	NA	0
Ecological systems	G	F	G	B
Water quality	G	G	G	0
Air quality	G	G	G	0
Land quality	F	F	G	B
Sound quality	VG	VG	G	A
Visual quality	F	F	G	B

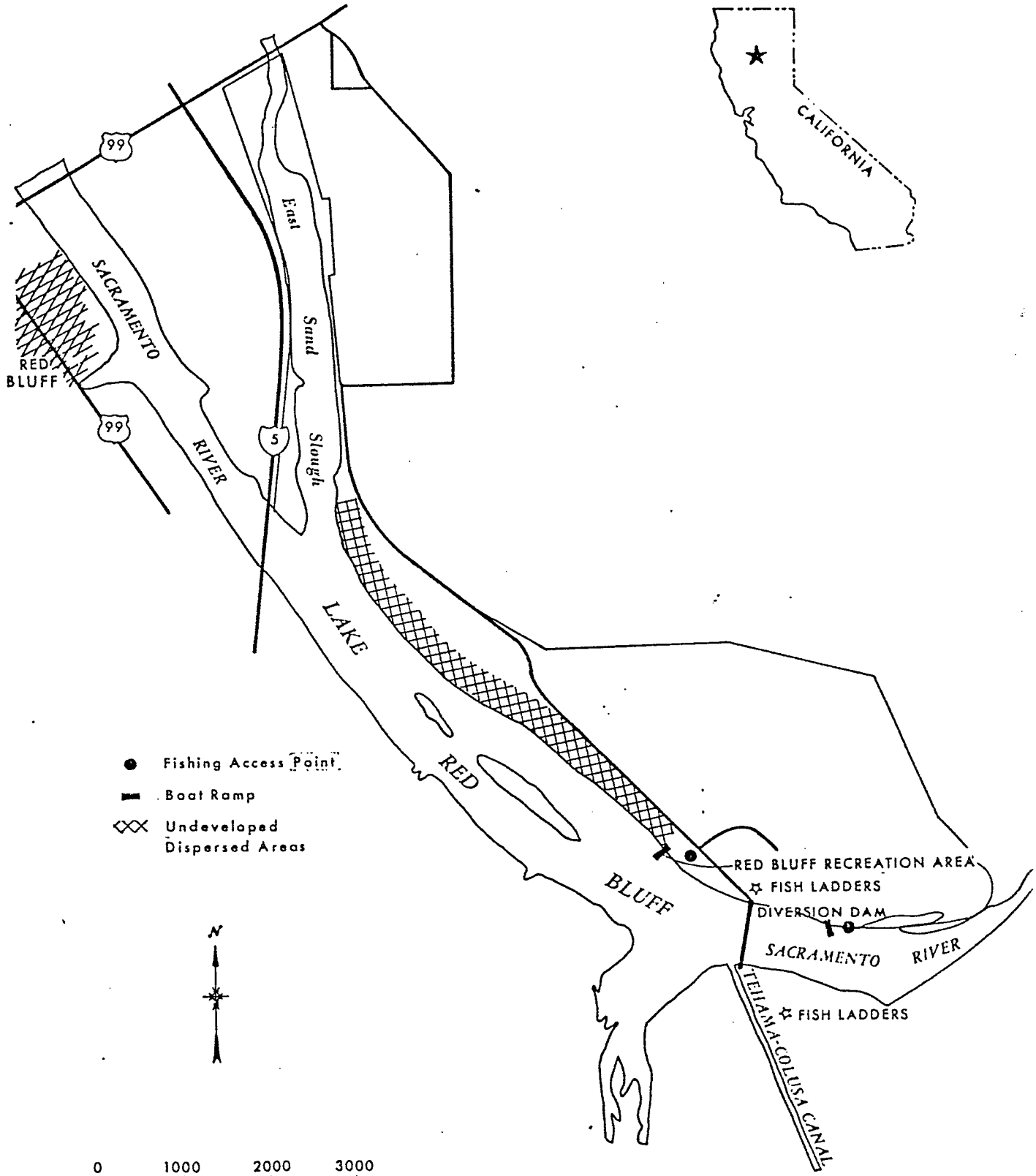
[a] Effect of plan is difference in quality between future without the project (no plan) and future with project (plan).

Quality	Effect
VP - very poor	SA - strongly adverse
P - poor	A - adverse
F - fair	0 - no effect
G - good	B - beneficial
VG - very good	SB - strongly beneficial
NA - not applicable	

The creek supplying East Park Reservoir is intermittent and has a poor fishery, at best. Flow releases below the reservoir are regulated and shut off at times when the reservoir reaches minimum pool. Even if flows were maintained to support a fishery, the land downstream, all the way to Stony Gorge Reservoir, is in private ownership with no public access.

Lake Red Bluff

Lake Red Bluff (figure 11) has ample parking and launch facilities, but could use added controlled camping facilities for overnight salmon anglers. Also, barrier vehicular control could curtail indiscriminate parking and driving on park property. The area could benefit from landscaping and planting of trees to provide shade in the hot summer.



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LAKE RED BLUFF

FIGURE 11

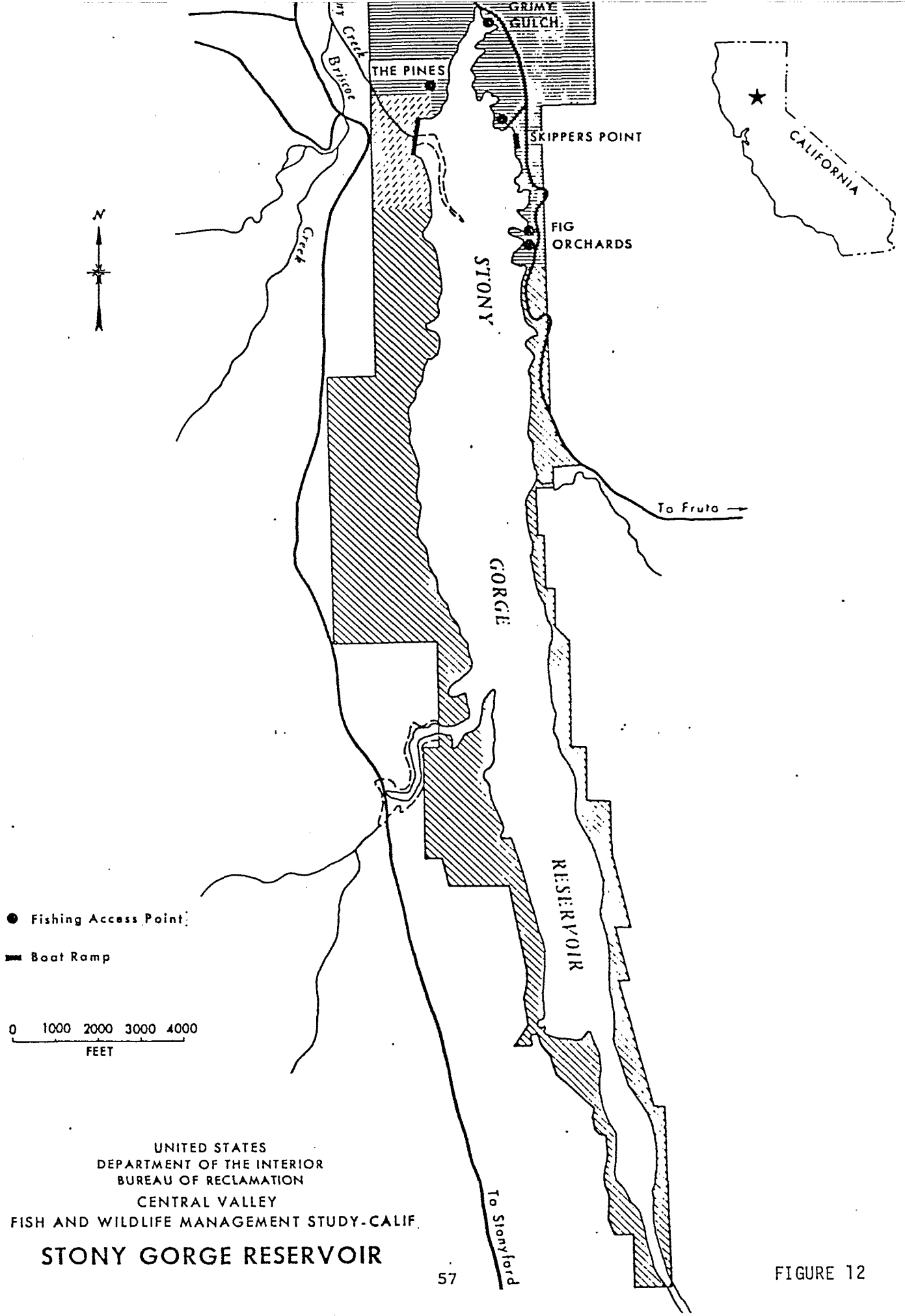
Stony Gorge Reservoir

Stony Gorge Reservoir access (figure 12) is limited to the north end of the reservoir. However, because of gentle terrain, what access there is covers several miles of shoreline.

Shore anglers have no problem parking or reaching the water. A lack of drinking water is a source of inconvenience and should be corrected for health and safety reasons. Also, fish cleaning stations at each of the two Fig Orchard areas have been suggested by management as being necessary to prevent sanitation problems.

The boat launch ramp at Skippers Point is in need of repair. It has crumbled and should be resurfaced before it becomes unusable. A conceptual site plan for a boat launch and day-use facility is shown on figure 13. The related benefit-cost estimate and environmental quality impacts are summarized in tables 8 and 9, respectively.

Stony Creek, between Stony Gorge Reservoir and Black Butte Lake, does not have good fishery potential because of low flows, high temperatures, and private surrounding ownership.



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STONY GORGE RESERVOIR

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FIGURE 12

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C-064652

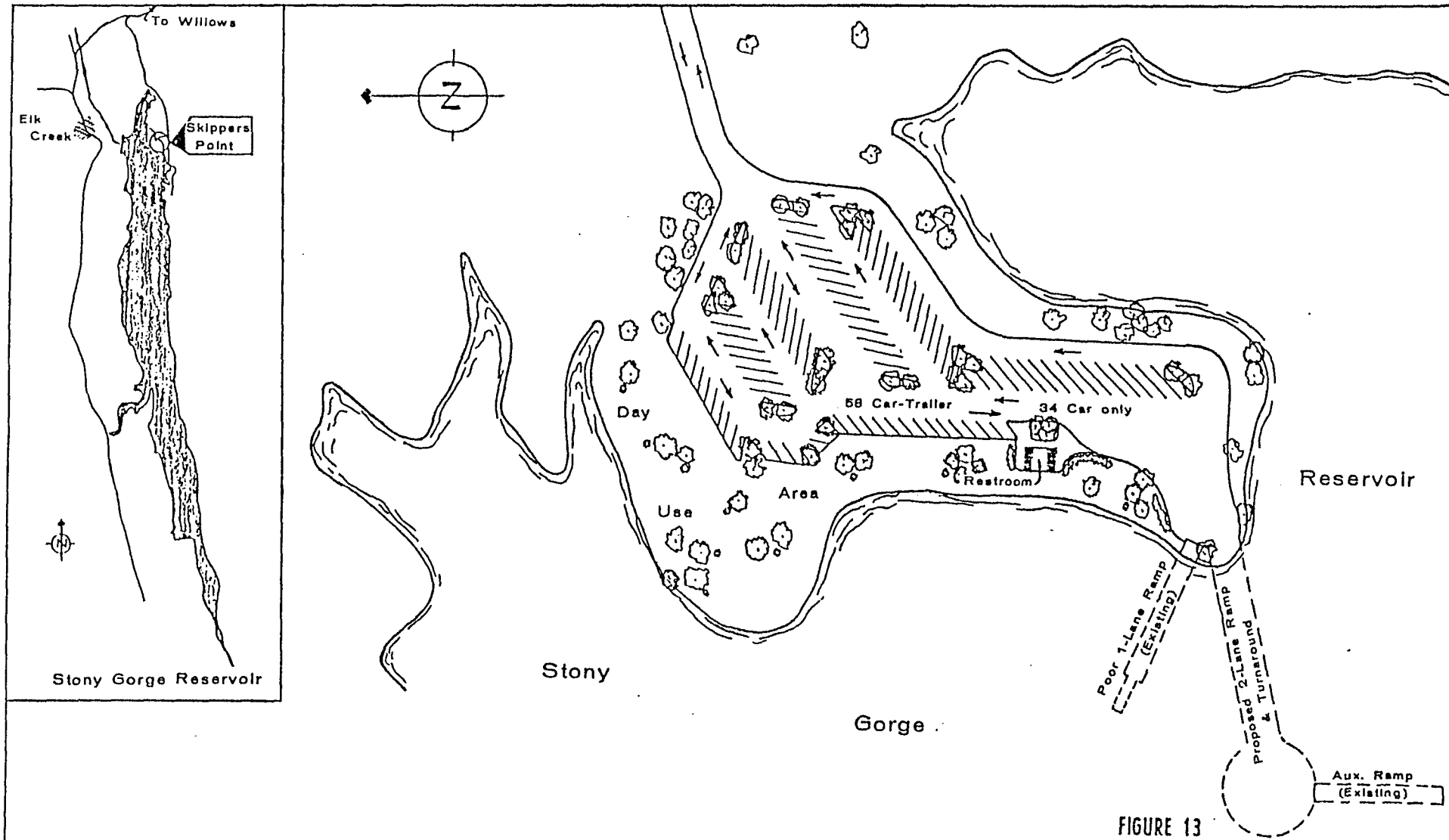


FIGURE 13

Stony Gorge Reservoir

Conceptual Plan of Skippers Point

Boat Launch and Day Use Facility

C—064653

Table 8. Benefits and costs, Stony Gorge Reservoir, Skippers Point boat launch and day-use facility

Beneficial effects[a]	
Direct user benefits[b]	
Recreation	$120,000
Adverse effects	
Construction costs	245,000
Annual equivalent Federal investment	18,000
Annual operating cost	26,000
Total annual cost	44,000
Net project benefits	76,000
Benefit-cost ratio	2.7 to 1

[a] External economies and employment of unemployed resources not identified.
[b] Annual equivalent value for 100 years at 7-3/8 percent interest.

Table 9. Environmental quality impacts, Stony Gorge Reservoir, Skippers Point boat launch and day-use facility

Environmental category	Present	Future		Effect of plan[a/]
		No plan	Plan	
Open space and greenbelts	G	F	F	A
Streams and stream systems	NA	NA	NA	0
Lakes	G	G	G	0
Beaches and shores	P	P	F	B
Wilderness, primitive, and natural areas	NA	NA	NA	0
Estuaries and wetlands	NA	NA	NA	0
Other natural beauty areas	NA	NA	NA	0
Archeological resources	NA	NA	NA	0
Historical resources	NA	NA	NA	0
Biological resources				
Flora	F	P	F	B
Fauna	F	P	F	B
Geological resources	NA	NA	NA	0
Ecological systems	G	F	G	B
Water quality	G	G	G	0
Air quality	G	G	G	0
Land quality	F	F	G	SB
Sound quality	VG	G	G	A
Visual quality	G	F	G	B

[a/] Effect of plan is difference in quality between future without the project (no plan) and future with project (plan).

Quality	Effect
VP - very poor	SA - strongly adverse
P - poor	A - adverse
F - fair	0 - no effect
G - good	B - beneficial
VG - very good	SB - strongly beneficial
NA - not applicable	

C-064655

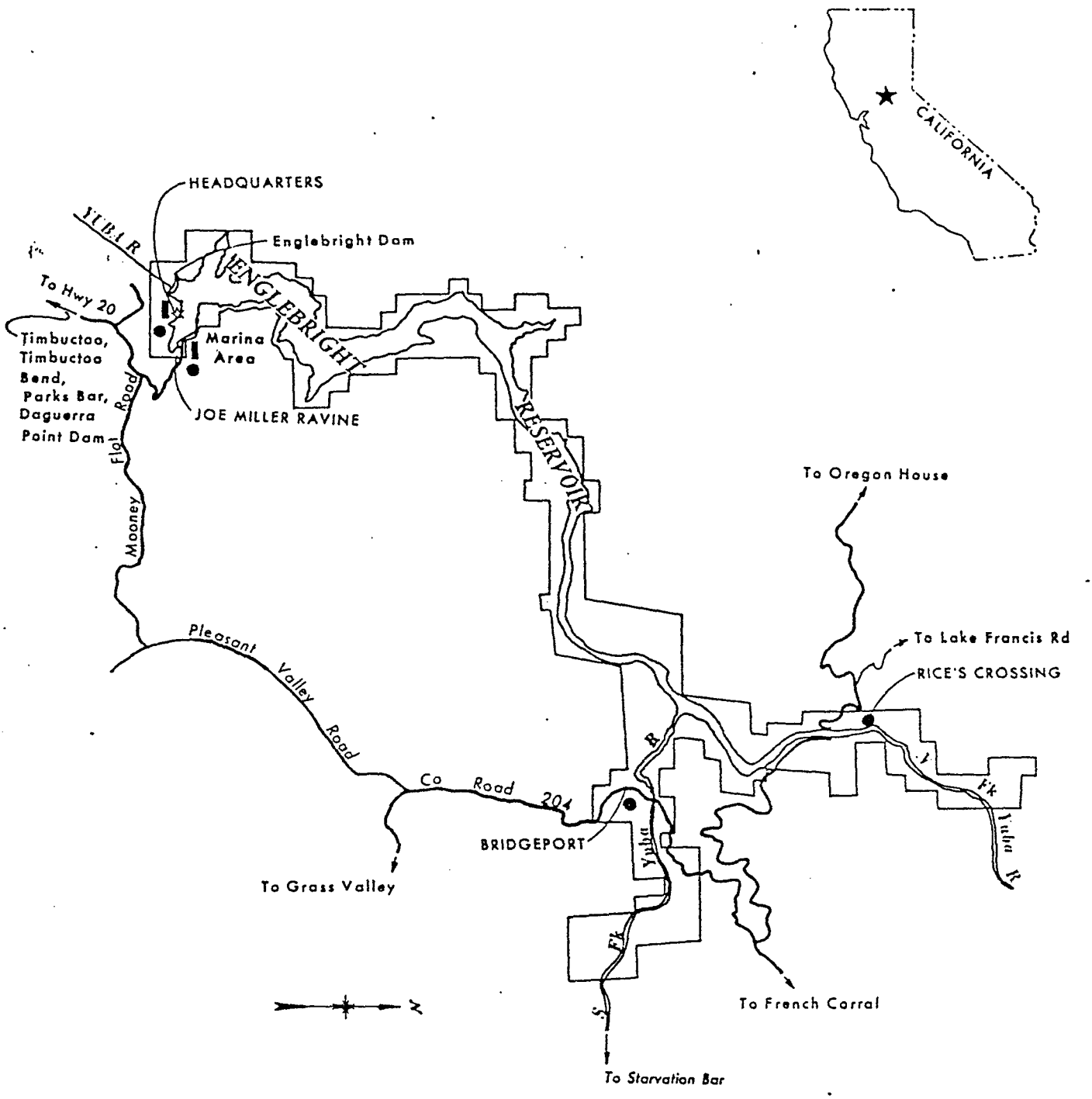
ENGLEBRIGHT RESERVOIR

Recreation at Englebright Reservoir (figure 14) is severely limited by extremely steep banks which largely dictate development opportunities. This fact, coupled with very warm summer temperatures and little shade, results in a recreational emphasis on boating and boat-oriented activities. Shore fishing is not extensive. Opportunities are not extensive either, but have been adequate to accommodate the 16 percent fishing participation rate of recreationists.

Two developed sites on the lake, headquarters and Joe Miller Ravine, have launch ramps for boat fishermen. They accommodate traffic satisfactorily, and barring unforeseen increased pressure, should be adequate through 1990.

Shore fishing is limited by limited parking and walkable shoreline. Parking spaces are taken largely by boaters, leaving little space for anglers wishing to fish from the banks. The problem has been partially solved by restricting some spaces at headquarters to 4 hour parking. Additional parking for boaters is available atop the hill about a quarter mile away. The acquisition of about 3 more acres at that site from a local landowner has been proposed to provide added parking space. Additional spaces below could then be reserved for shore anglers.

Also proposed is a trail along the bank linking the two developed sites. It would increase accessible bank space for shore fishing. Perhaps the proposal could be expanded to include bank space extending to, or even around, the point extending west from the Joe Miller/marina area.



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ENGLEBRIGHT RESERVOIR

FIGURE 14

According to the master plan, access to the Rice's Crossing area is by boat only. However, there is an unimproved road that is generally usable by four-wheel drive vehicles only; improvements planned do not include road upgrading. Lake officials prefer not to open the site since sufficient staff is not available for increased maintenance and fire prevention. According to officials, present users comment that the area provides a uniquely remote experience which development would destroy. Development of the site could remove the immediate fire hazard.

Rice's Crossing fishing access is very close to the upper end of the lake at the spot the north fork of the Yuba River enters the reservoir. By taking a short walk upstream, an angler could experience river fishing. Lake Francis Road, which becomes an unimproved dirt road as it approaches the Yuba River, provides river fishing access about 1-1/4 miles above Rice's Crossing.

River access on the Yuba above and below Englebright Reservoir is quite good. The south fork above the lake is crossed by Pleasant Valley Road about 3/4 mile up from the confluence of the two forks. A four-wheel drive vehicle road extends down from French Corral before becoming a foot trail which also reaches the south fork at Starvation Bar about 4 miles further upstream.

The river below Englebright Dam maintains a rather good fishery with salmon gaining access upstream via the fish ladder at Daguerre Point Dam. Excellent stream access exists from the bridge at Parks Bar extending about 2 miles up toward the reservoir. Also, a county dirt road extends from Timbuctoo to Timbuctoo Bend.

One area in need of attention is the Bridgeport access on the south fork just above the reservoir. Access is by county road which crosses the stream. The area is managed by the county, but appears substandard. Many anglers are parking on private land across the road. The site has good possibilities and could be enhanced with proper landscaping, parking, and improved sanitation facilities. A unique covered bridge at the site is being vandalized, which further degrades the area. Development could provide stream fishing access at an attractive area possibly of significant historical interest. The master plan schedules development of the area in the interim phase. However, management of facilities must first be worked out with the county or taken over by the recreation manager of the reservoir, the Corps of Engineers (CE).

Access opportunity does not appear to be threatened in this decade, if present facilities are developed as outlined for the Bridgeport area. Care should be taken, whether by the county or CE, to prevent undue degradation to an area whose future value should be safeguarded.

The master plan does not designate any areas, aside from those currently existing, for vehicular access development. Several areas are scheduled for boat access development. For this reason, nonboaters may find future shoreline opportunities somewhat bleak. If nonboater use at Rice's Crossing eventually exceeds the area's capacity, this would be a logical area for development of further vehicular access. Development of such access is not needed at this time, but should be considered to meet future demand. Since the area is rather far from presently maintained areas, additional personnel may be required for its maintenance.

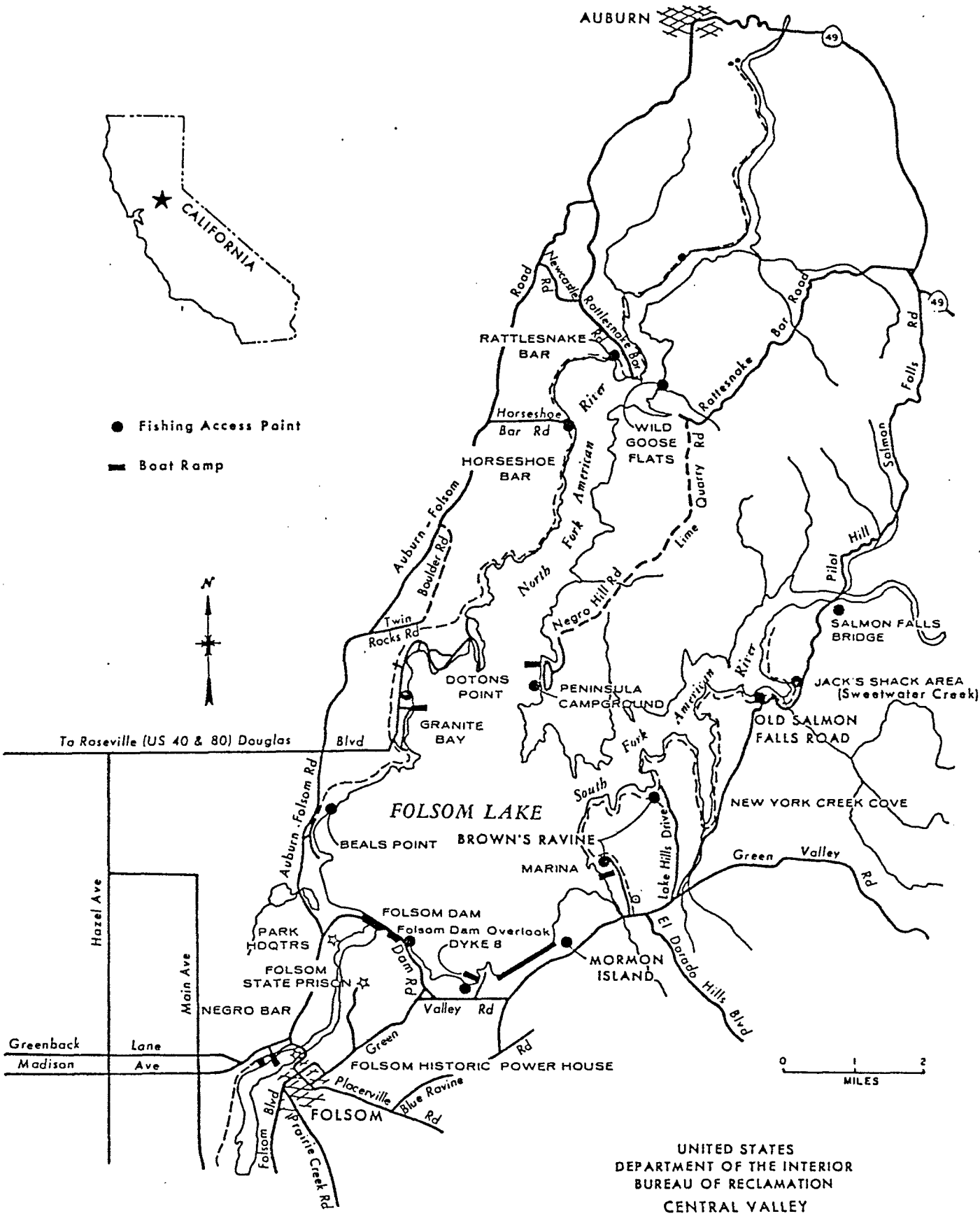
FOLSOM LAKE AND LAKE NATOMA (NIMBUS DAM)

Folsom Lake and Lake Natoma (figures 15 and 16, respectively) comprise the two existing units of the Folsom Lake State Recreation Area (FLSRA). They are managed together, are adjacent to each other, and will be discussed together.

The FLSRA is located on the outskirts of Sacramento and development is progressing throughout the region. It is one of the most heavily utilized, water-based recreation resources in the State of California. About every conceivable water-oriented recreation activity occurs on the FLSRA.

During the off-recreation season (mid-September to mid-May), fishing is the primary activity. Pressure from other recreationists is not severe and anglers have plenty of access opportunity of high quality. However, during the summer recreation season, activities other than fishing increase dramatically. Thus, it is difficult to speak of the needs of anglers alone at FLSRA. Consequently, potential actions are taken from the State Park master plan and have the effect of benefiting total recreation while also meeting the needs of anglers.

In consideration of total recreation, improvements to benefit anglers taken from the master plan may not always be of top priority. There may be other improvements for recreation not related to fishing which have a more urgent need. Consequently, a program for improving fishing benefits may not appear to be in the most logical sequence if considered within the total plan. However, the steps could be taken to benefit anglers with minimum impact on the basic plans for the FLSRA.



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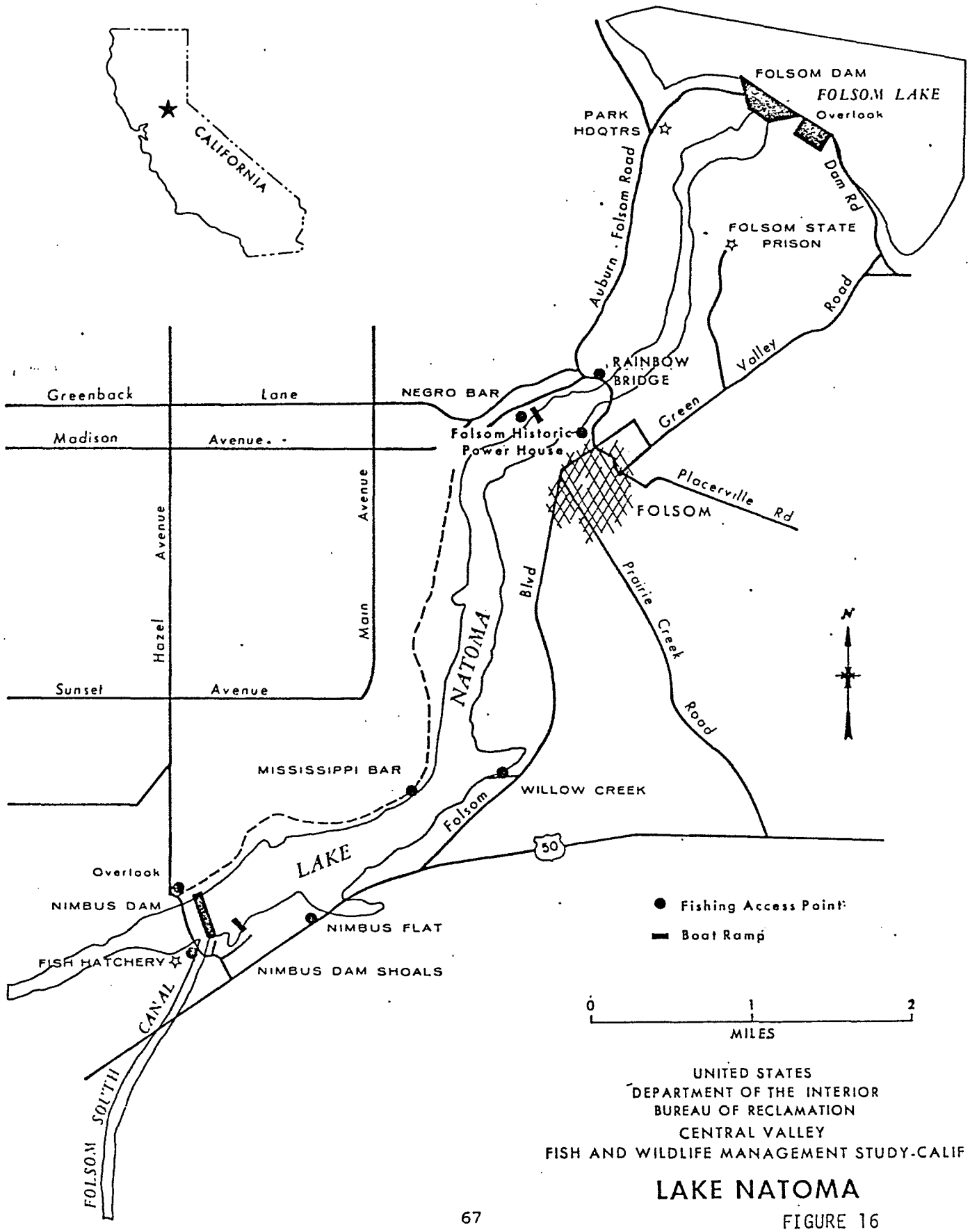
FOLSOM LAKE

FIGURE 15



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LAKE NATOMA

FIGURE 16

Sanitation facilities receive heavy use and will soon be over-taxed. Within the next 3 to 5 years, additional units may be necessary at the following locations:

Folsom Lake	Lake Natoma
Jack's Shack (Sweetwater Creek)	Historic Powerhouse
Dyke 8	Willow Creek
Mormon Island Cove	Nimbus Flat
Observation Point (Folsom Lake Overlook)	Nimbus Overlook
Beals Point (currently under development)	Rainbow Bridge
Granite Bay	
Rattlesnake Bar (East and West banks)	
Salmon Falls	

Parking inadequacies exist at a number of locations during the summer. Areas under heavy pressure which require expansion and which are included in the master plan are:

Folsom Lake	Lake Natoma
Jack's Shack (Sweetwater Creek)	Rainbow Bridge
Brown's Ravine	Historic Powerhouse
Dyke 8	
Mormon Island Cove	
Beals Point	
Granite Bay	
Rattlesnake Bar (East and West banks)	
Salmon Falls	

In order to maintain the health and safety of the public, the following planned improvements also have been selected:

Folsom Lake	
Jack's Shack	Widen and pave access road
Brown's Ravine	Pave beach road to below high water mark at Hobie Cove Provide fish cleaning station

Dyke 8	Provide fish cleaning station Bring in drinking water Improve sight distance and provide left turn lane at entrance from Green Valley Road Provide brake test sign and area before top of hill for vehicles leaving access area
Rattlesnake Bar, East Bank	Improve access road
" , West Bank	Provide fish cleaning station Provide courtesy dock
Peninsula	Provide courtesy dock Provide fish cleaning station
Granite Bay	Provide fish cleaning station
Beals Point	Provide fish cleaning station
Lake Natoma	
Negro Bar	Provide fish cleaning station
Nimbus Flat	Provide fish cleaning station
Willow	Repair entrance road

In order to disperse use and improve shoreline access, trail systems are planned at the following locations:

Folsom Lake	Lake Natoma
Observation Point	Historic Powerhouse Nimbus Overlook

Boat-launch facilities are strained at peak times and two additional lanes are planned for Folsom Lake at Dyke 8.

Currently, neither lake has special access for handicapped anglers. Negro Bar at Lake Natoma is quite flat and would provide a nice slope for handicapped access. A paved ramp down to low level would permit easy access at all lake levels.

The American River within FLSRA boundaries has extremely limited shore access due to its severe topography. Development is not advisable and deemed unnecessary. Anglers can access both the north and south forks by boat. Car-top launching at Salmon Falls provides south fork access and the Rattlesnake Bar ramp can be used to access the north fork. Upstream from the FLSRA, there is little access opportunity due to severe terrain and private ownership of the land.

Below Nimbus Dam the river has very good access for shore and boat anglers. County sites extend right down to the confluence with the Sacramento River and a bike trail extends from Nimbus Dam all the way to Discovery Park. In addition, the bike trail will be extended from Nimbus Dam to Beal's Point at Folsom Lake.

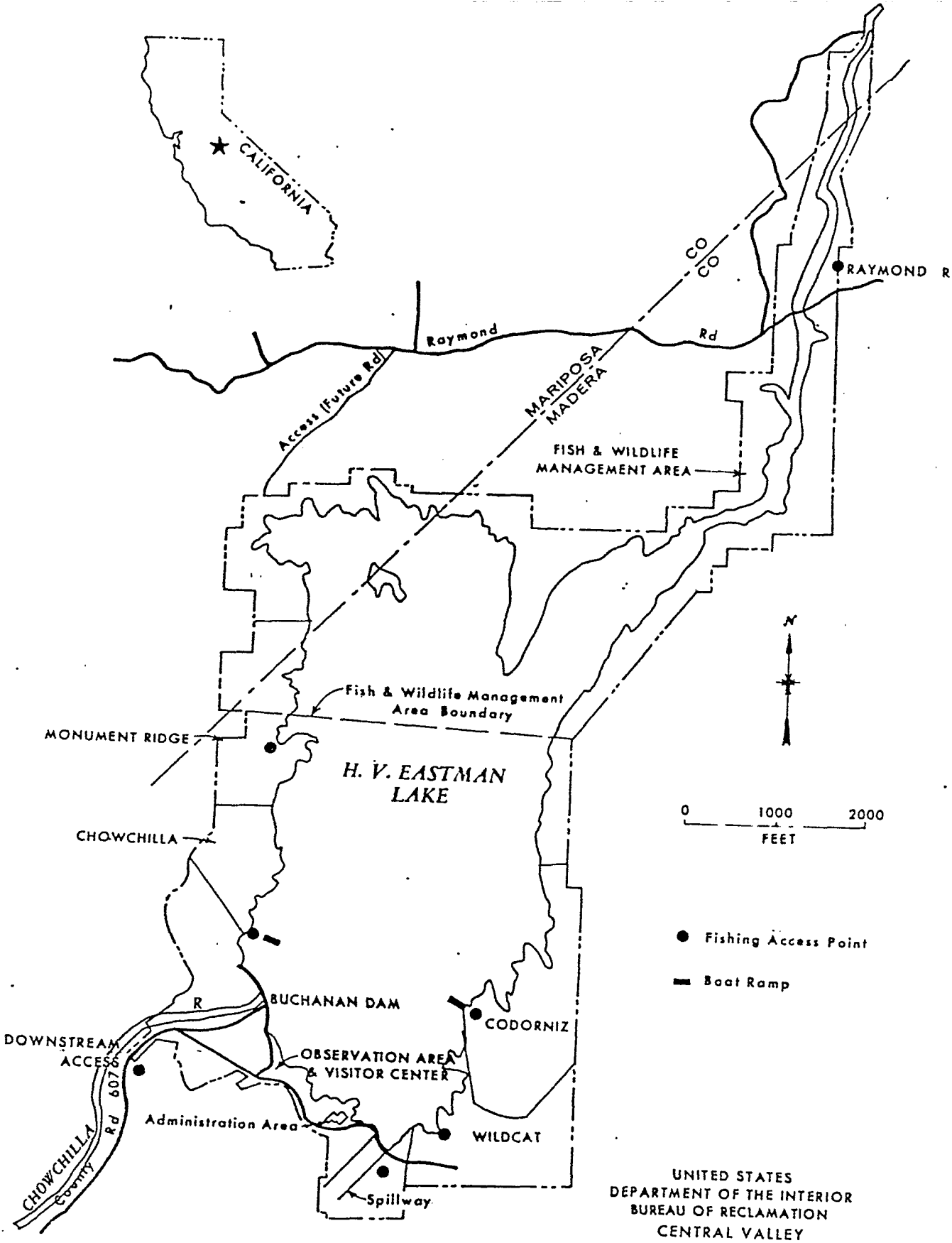
H. V. EASTMAN LAKE (BUCHANAN DAM)

The two major problems that affect recreational planning at H.V. Eastman Lake (figure 17), are water level fluctuation and availability of parking. According to the master plan, lake levels were originally expected to be maintained much lower than has actually been the case. Because of the unusually high levels, potential parking areas are consistently under water.

Eastman Lake, a new project, is expected to have a rapid increase in fishing use as anglers learn of its existence and the fishery develops. Visitation in 1981 was estimated to be 200,000 visitor days. At an annual increase rate of 10 percent, the present facility capacity of about 250,000 visitor days would be reached within 3 years. The master plan includes provision for increases beyond that level, but P.L. 89-72 restrictions present problems. In the event that water levels remain consistently high, inundating lower level parking areas, additional parking must be developed.

The master plan calls for the inclusion of a marina facility on the west shore below Monument Ridge. Additional parking, if needed before construction of the marina, can be developed on this site. It will be necessary eventually, and is a good location for day-use overflow.

Boat launch facilities consist of three ramp lanes on the east and on the west sides of the lake. They are considered adequate through the decade. Low-level ramps exist under water, along with more parking. Consequently, launching adequacy is not affected by drawdown.



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H. V. EASTMAN LAKE

FIGURE 17

The Chowchilla River is an intermittent stream with a negligible fishery upstream from the project. Downstream from the lake, there is a good access point developed just below Buchanan Dam. Warm-water fish, especially catfish and bluegill, manage to survive, but flows are shut off until needed by the Chowchilla Water District. If the District could be convinced to allow minimal flow, a productive downstream fishery might be established. The Department of Fish and Game would be required to research this possibility. The presently existing access below the dam would provide a good fishing opportunity should the District establish those releases. The stream flows across several ranches before entering a slough. Two county road crossings could provide additional fishing. Access through private farmlands by anglers at these points would have to be negotiated.

The lake has been utilized by handicapped anglers. Generally, they have used a road which descends to the lake south of a swimming area on the west bank. This does not represent a quality experience; improved handicapped facilities should be explored. The California Association for the Physically Handicapped in Fresno should be consulted on the matter. If sufficient demand is found to exist, the possibility of a courtesy dock should be researched.

HENSLEY LAKE (HIDDEN DAM)

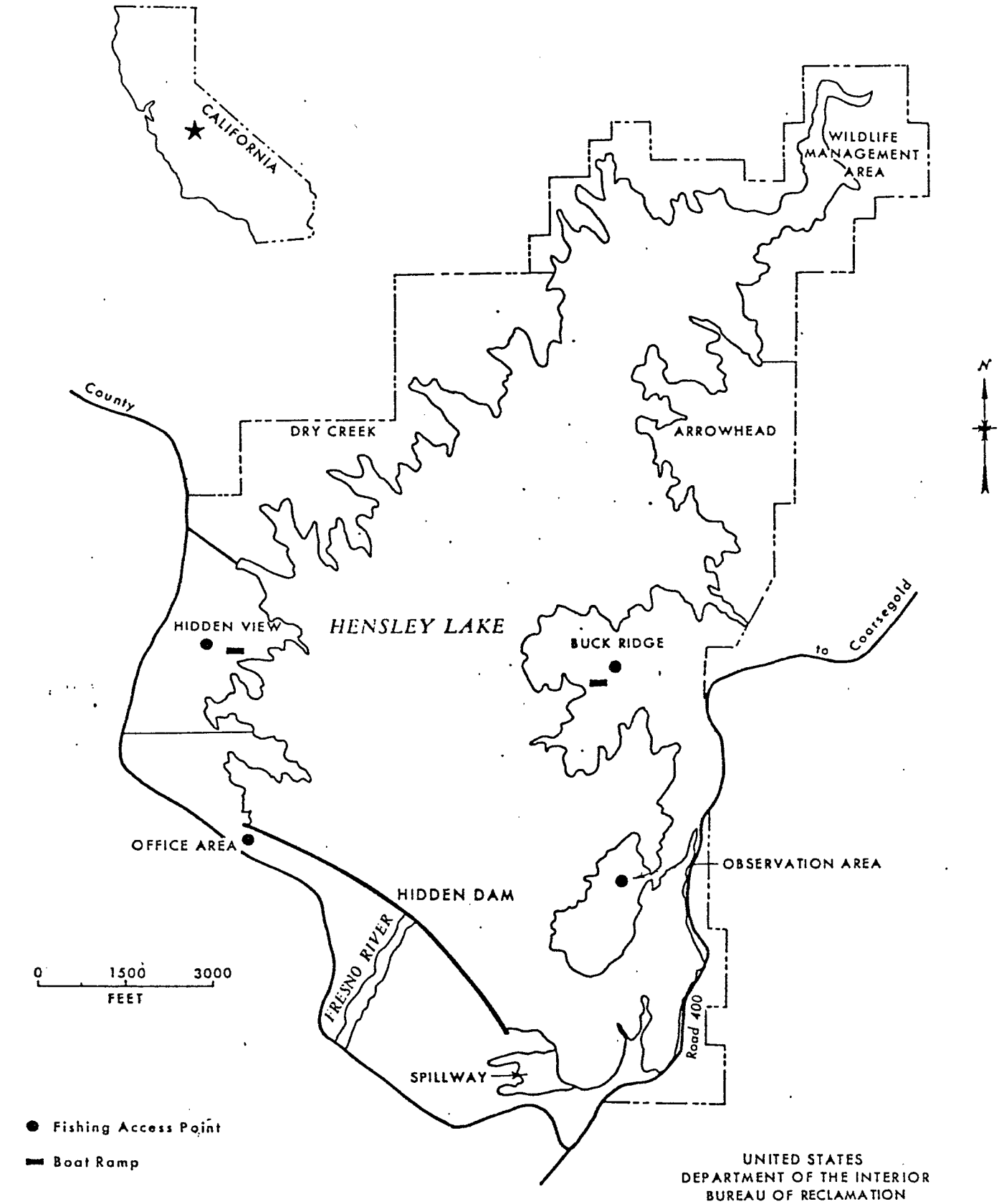
In operation only since 1978, visitor use already is taxing Hensley Lake's (figure 18) initial development. It is expected that pressure will continue to develop and soon surpass the recreation potential of the reservoir. Because the project has been operational for such a short time, it is not a well known facility. Also, the fishery has yet to develop its expected potential. When the fishery develops and word spreads of its existence, more and more locals and travelers will seek access to the project facilities.

Use of existing facilities has approached its maximum potential during recent recreation seasons. At high water, parking is limited and lots have been filled as early as 8:00 a.m. on some days during weekends. An estimated 500 recreationists were turned away July 4, 1980.

Boating has increased dramatically and is expected to continue to do so in the next 10 years. The ramps themselves are adequate at all water levels, but available parking capacity at high water levels limits use. The problem is not how to get the boats in the water, but what to do with all the cars and trailers after the boats are launched. Such heavy use by boaters also has limited spaces available for day-use bank fishermen.

The popularity of bank fishing has outstripped planned facilities. Parking has spilled out of lots, with large numbers attempting to find parking along Road 400. People park at every possible turnout; use has been spontaneous and has been difficult to control.

One undeveloped area has come to resemble a parking lot, but is rather rough. It has good potential to provide additional high water



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HENSLEY LAKE

FIGURE 18

access and would not require a great deal of work to bring it up to standard. Boulders could be rearranged to increase parking capacity by 30-40 percent. Grading, some fill, trash receptacles, portable sanitation facilities, and appropriate signs would make it a valuable addition. Provision at this site for shore anglers would help alleviate parking shortages for boaters at ramp areas. A conceptual site plan is shown on figure 19. The benefit-cost information and environmental quality impacts are summarized in tables 10 and 11, respectively.

No provision for fishing access for the handicapped is available. An old haul road south of the Buck Ridge area, if rehabilitated, could provide access to the water for the handicapped at all elevations without great expense. In this manner, wheelchairs could approach the shore, and the elderly would not have to climb over rough terrain.

The Fresno River provides only intermittent flows upstream from the project with only a marginal fishery any time of year. Downstream flows are not maintained for fishery sustenance and are shut off completely after the irrigation season. According to field personnel, approximately 120 ft^3/s would be necessary to support a viable fishery.

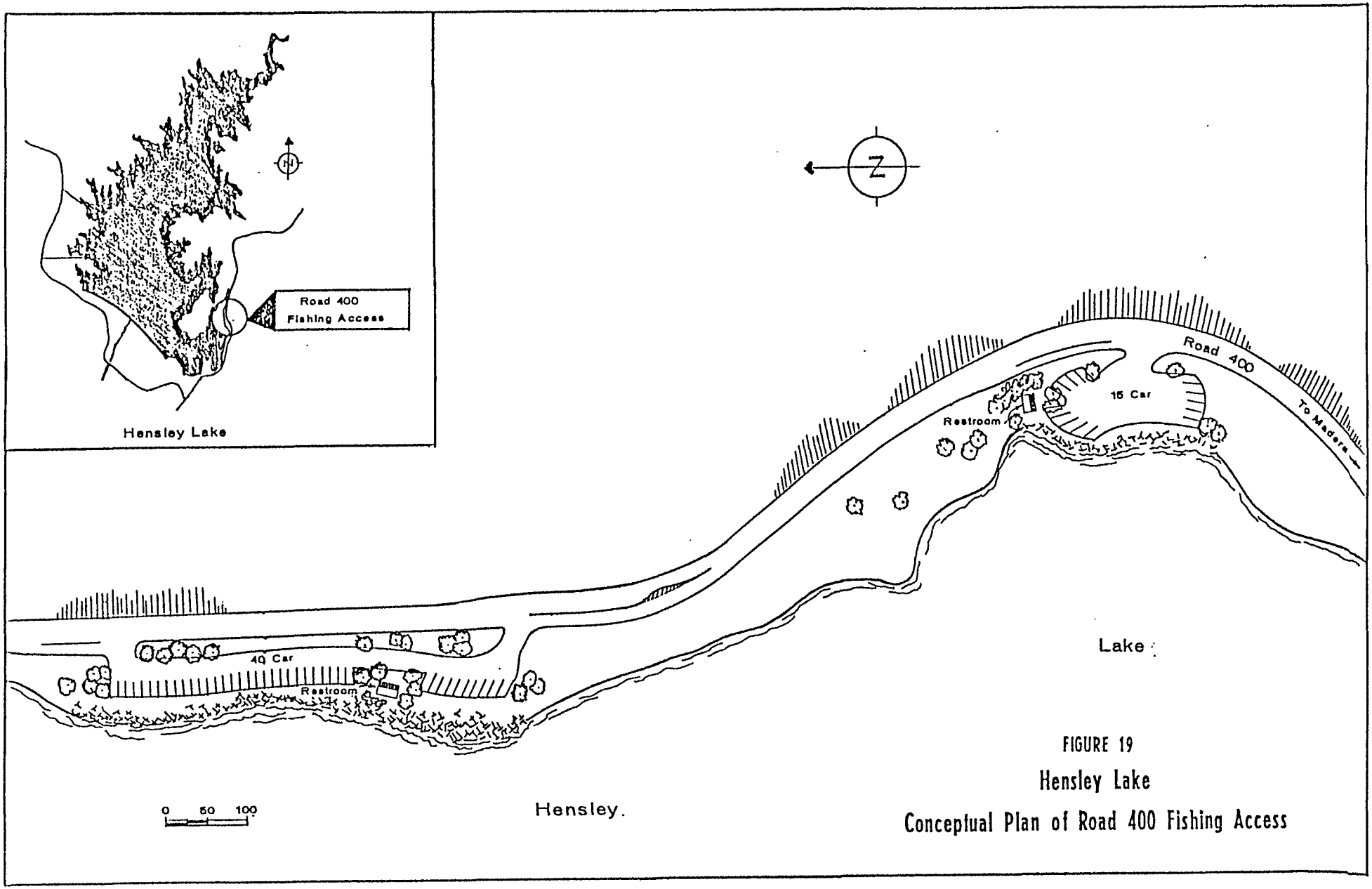


FIGURE 19

Hensley Lake

Conceptual Plan of Road 400 Fishing Access

Table 10. Benefits and costs,
Hensley Lake,
Road 400 fishing access

Beneficial effects[a]	
Direct user benefits[b]	
Recreation	$ 62,000
Adverse effects	
Construction costs	160,000
Annual equivalent	
Federal investment	12,000
Annual operating cost	14,000
Total annual cost	26,000
Net project benefits	36,000
Benefit-cost ratio	2.4 to 1

[a] External economies and employment of unemployed resources not identified.
[b] Annual equivalent value for 100 years at 7-3/8 percent interest.

Table 11. Environmental quality impacts, Hensley Lake, Road 400 fishing access

Environmental category	Present	Future		Effect of plan[a/]
		No plan	Plan	
Open space and greenbelts	F	F	P	A
Streams and stream systems	NA	NA	NA	0
Lakes	F	F	F	0
Beaches and shores	F	P	G	B
Wilderness, primitive, and natural areas	NA	NA	NA	0
Estuaries and wetlands	NA	NA	NA	0
Other natural beauty areas	NA	NA	NA	0
Archeological resources	NA	NA	NA	0
Historical resources	NA	NA	NA	0
Biological resources				
Flora	VP	VP	F	B
Fauna	P	P	P	0
Geological resources	NA	NA	NA	0
Ecological systems	NA	NA	NA	0
Water quality	G	G	G	0
Air quality	G	G	G	0
Land quality	F	F	G	B
Sound quality	F	F	F	0
Visual quality	F	F	VG	SB

[a/] Effect of plan is difference in quality between future without the project (no plan) and future with project (plan).

Quality	Effect
VP - very poor	SA - strongly adverse
P - poor	A - adverse
F - fair	0 - no effect
G - good	B - beneficial
VG - very good	SB - strongly beneficial
NA - not applicable	

JENKINSON LAKE (SLY PARK DAM)

Jenkinson Lake (figure 20), in the opinion of Bureau of Reclamation planners and lake managers, is being used to its approximate maximum carrying capacity for water-oriented recreation. Existing recreation facilities are under severe stress, but additional development is considered beyond the limits of this water resource and its shorelines. Demand soon will surpass opportunity and use limits will be required to protect the resource. Quotas will have to be established for shoreline and water activities if the resource is to avoid degradation.

For these reasons, no new recreation developments are included in the master plan for the purpose of increasing recreation use. Two areas are under consideration for development to ease pressure on sites currently overused. They will not place more users in the park, but will help distribute use more evenly. One of these areas, under U.S. Forest Service jurisdiction, will require acquisition; the other is within park property (areas A and B, respectively, on figure 20).

The master plan calls for a new boat ramp near the east end of the lake near the Stonebraker area. Its purpose will be to control conflicts between anglers and power boaters. Small craft would launch at the east ramp and larger craft would be limited to the present west boat launch area.

Improvements at Jenkinson Lake must be designed to upgrade facilities and minimize the impacts of capacity visitation. Anglers will be among those turned away as demand exceeds opportunity. Those that do gain entrance must be accommodated as comfortably and conveniently as possible.

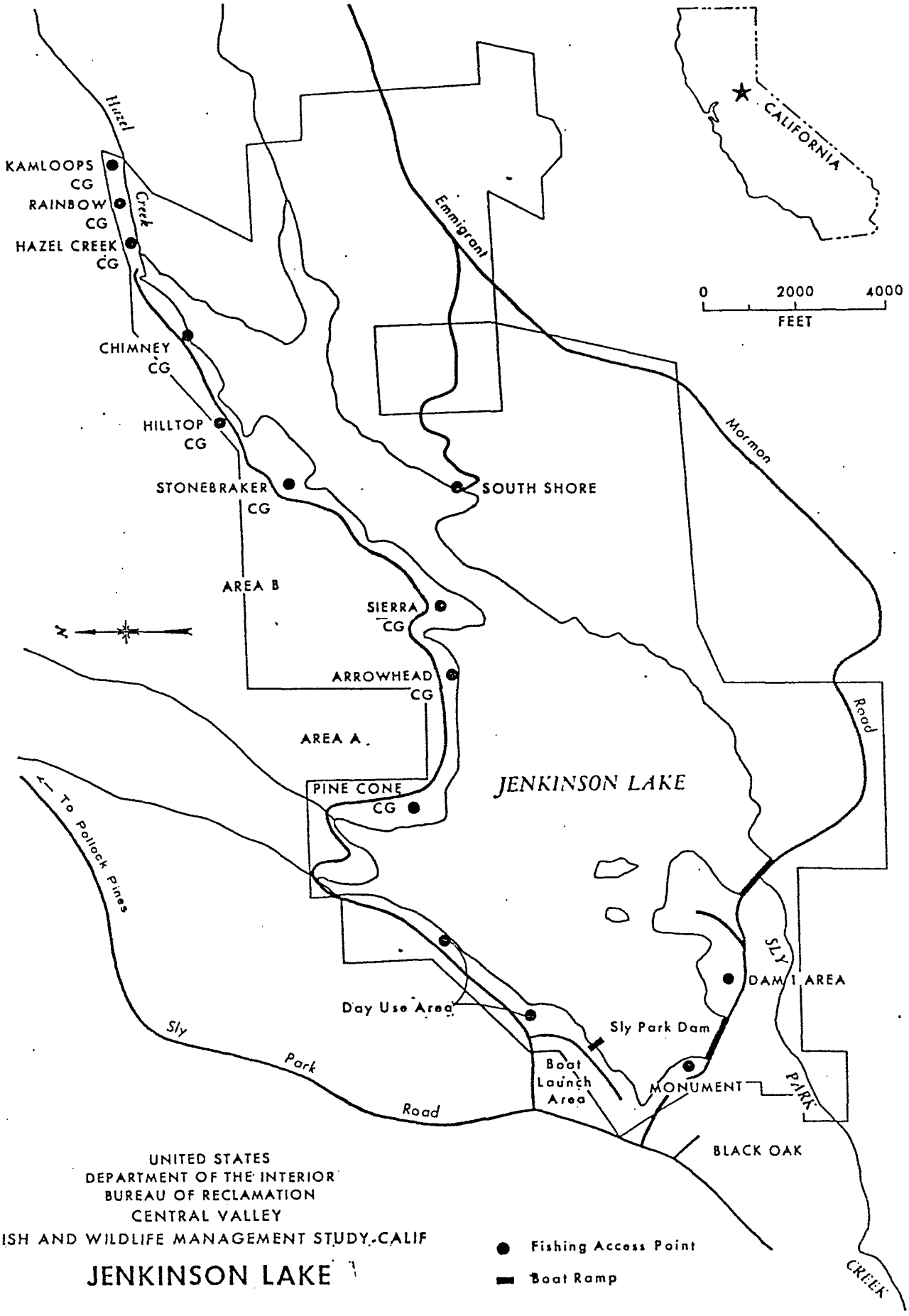


FIGURE 20

There is little demand for stream fishing upstream or downstream from the project. Hazel Creek, the major headwater stream for Jenkinson Lake, is an intermittent stream. Sly Park Creek, leaving the project, sustains a meager fishery and is not considered to have good potential.

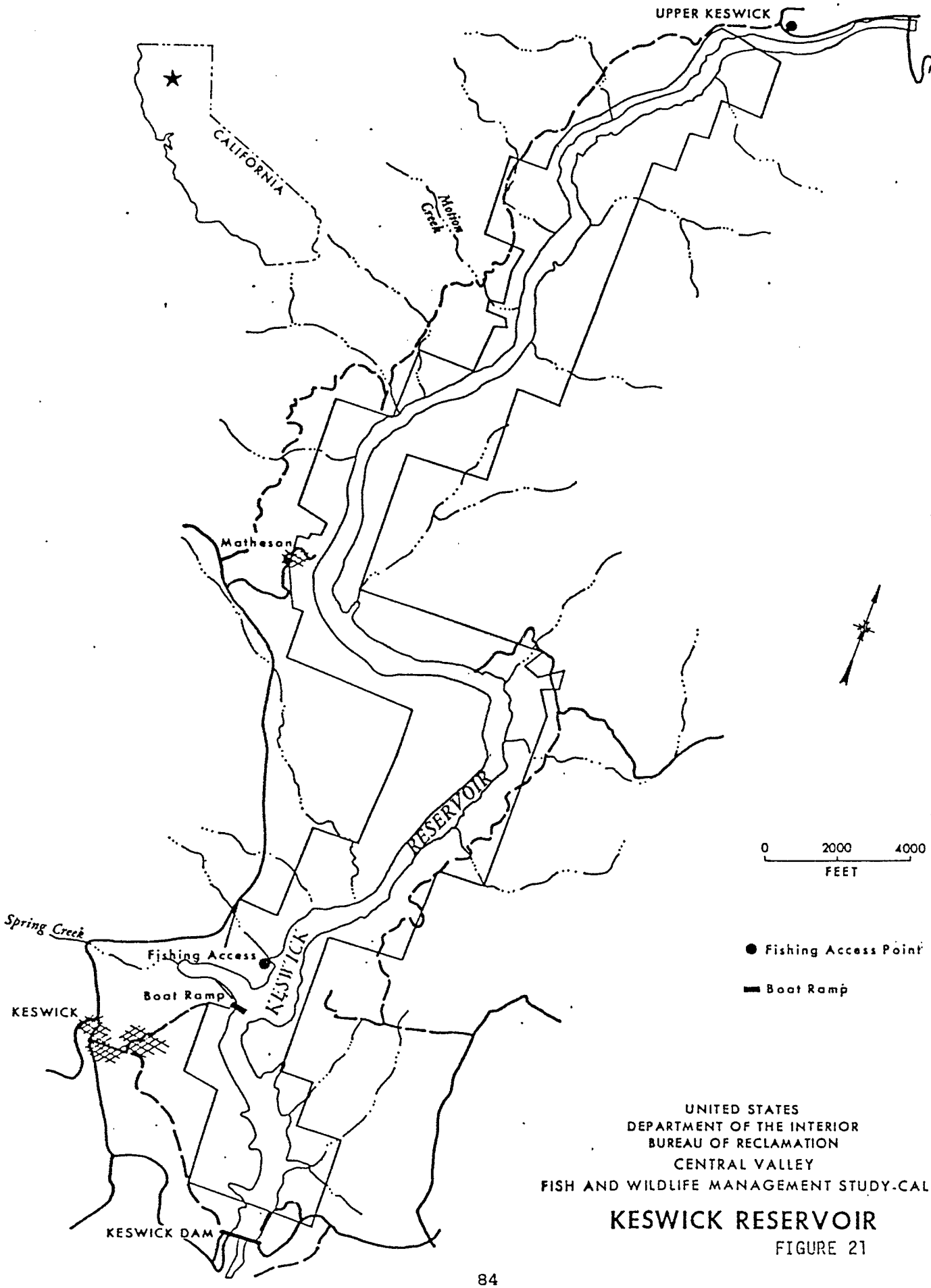
KESWICK RESERVOIR

Keswick Reservoir (figure 21) represents a unique opportunity to provide quality bank and light duty boat access for which it is ideally suited. Provision of such facilities on a small body of water with wild attributes would be a nice complement to the open water boating-oriented opportunities of Shasta Lake. In order to retain that sense of wildness, development should remain low key, with emphasis on minimal alteration of the resource.

Current access includes a boat ramp and parking lot just above the town of Keswick. This is the only developed access on the lake despite the fact that the Recreation Development Plan designates additional access and facilities at various points.

The Bureau of Reclamation has had matching funds available for several years to improve facilities in conjunction with the managing county. However, the county has not been able to match any of those funds; there has yet to be any improvement to the facilities originally provided by the Wildlife Conservation Board. The parking lot, boat ramp, and sanitation facility at the site are still intact, but the water pump has been inoperative for some time.

It appears that the county does not have the funds for additional improvements. Management of Keswick Reservoir has been at a standstill the last few years and this is not expected to change. It could be in the best interest of the public to return the area to management by the Bureau of Reclamation.



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KESWICK RESERVOIR

FIGURE 21

Ideally, reauthorization for recreation development would allow the Bureau of Reclamation to provide a quality experience without undue expense. Even without that authorization, however, the reservoir's proximity to the Bureau field office at Shasta Dam would facilitate improved management under minimum health and safety standards.

Keswick Reservoir is closely linked with Shasta Lake which receives tight management under the U.S. Forest Service. Because of its relationship with Shasta, Keswick could be operated to complement the recreational opportunities at Shasta Lake. In that way, the needs of shore anglers could receive the attention not provided on the boat-oriented Shasta Lake. Given the opportunity, the Bureau of Reclamation or U.S. Forest Service could acquire responsibility for management of Keswick Reservoir and provide a quality environment in keeping with those environments at Shasta and other surrounding lakes. The U.S. Forest Service presently does administer a small portion of the upper Keswick area.

Regardless of who manages Keswick, adequate shore access facilities should be provided. The launch ramp which exists is sufficient.

Mining operations have left a legacy of heavy metal contamination which severely degrades the lower portion of Keswick. The lakebed from Spring Creek down to Keswick Dam supports only a minor portion of the reservoir fishery. (Heavy metal contamination in Spring Creek is the subject of a separate investigation under the Central Valley Fish and Wildlife Management Study.) The lake from Matheson up to Shasta Dam, which is relatively unaffected, supports a native trout fishery as well as stocked fish. The water is cold, releases are consistent, and habitat is supportive of a fishery which produces trophy-sized trout. The fishing

access established by the Wildlife Conservation Board is well below the Matheson area and within the reach of the heavy metal contamination during the winter. No shore access is currently managed or maintained above those polluted waters.

Anglers who use the lake regularly know where the fish are and gain access via a number of dirt roads as well as the paved County road just below Shasta Dam. The dirt roads are mostly suited to four-wheel drive vehicles, and the County access road is by far the best and safest route to a segment of the shoreline above Motion Creek. The County road offers an excellent opportunity to improve shoreline access where the fishery is thriving, by providing access to an old railroad grade. The abandoned railbed, which has had the rails removed, provides a solid base for automobile use. A conceptual site plan for fishing access and day-use in this area, administered by the U.S. Forest Service as part of the National Recreation Area, is shown on figure 22. The benefit-cost estimate and environmental quality impacts are summarized in tables 12 and 13, respectively. The site has been used as a hang glider landing area for several years. Further development should include input from the hang gliding public to insure that fishing and day-use activities do not conflict. Further down the road, two washed out areas need culverts for the rainy season, but the road is drivable by four-wheel drive vehicles all the way to Matheson, paralleling the lakeshore at a distance of about 50 yards. Although the bank is fairly steep down to the water, at various points the terrain is less severe, and a vehicle can be pulled off onto the shoulder. From there, a person can walk down to the water to fish. The Bureau of Land Management and Shasta County

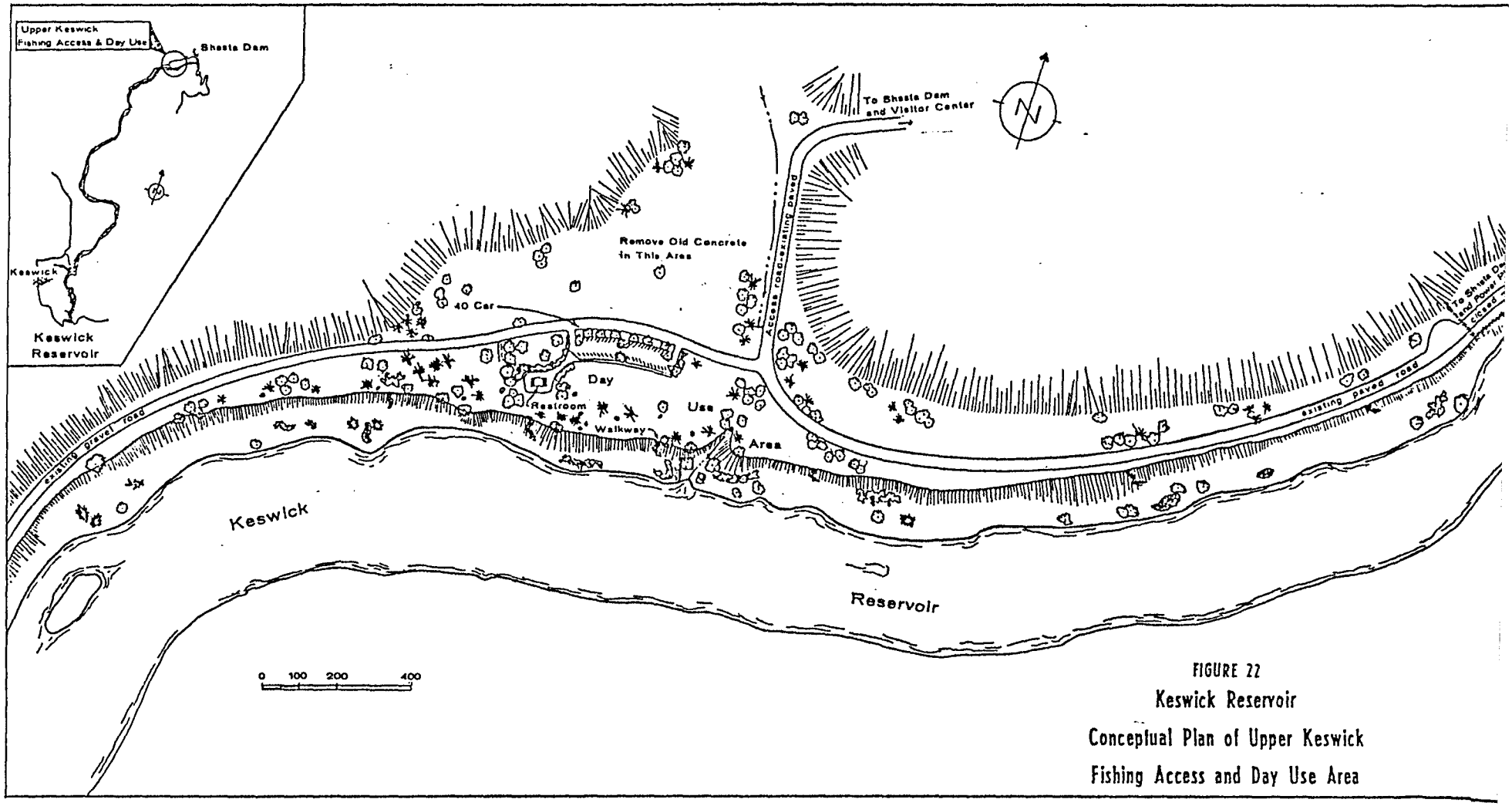


FIGURE 22
Keswick Reservoir
Conceptual Plan of Upper Keswick
Fishing Access and Day Use Area

C-064682

Table 12. Benefits and costs at Keswick Reservoir, upper Keswick fishing access and day-use area

Beneficial effects[a]	
Direct user benefits[b]	
Recreation	$ 38,000
Adverse effects	
Construction costs	109,000
Annual equivalent	
Federal investment	8,000
Annual operating cost	9,000
Total annual cost	17,000
Net project benefits	21,000
Benefit-Cost ratio	2.2 to 1

[a] External economies and employment of unemployed resources not identified.
[b] Annual equivalent value for 100 years at 7-3/8 percent interest.

Table 13. Environmental quality impacts, Keswick Reservoir, upper Keswick fishing access and day-use area

Environmental category	Present	Future		Effect of plan[a/]
		No plan	Plan	
Open space and greenbelts	VG	G	G	0
Streams and stream systems	NA	NA	NA	0
Lakes	G	G	G	0
Beaches and shores	VG	G	G	0
Wilderness, primitive, and natural areas	NA	NA	NA	0
Estuaries and wetlands	NA	NA	NA	0
Other natural beauty areas	G	G	G	0
Archeological resources	NA	NA	NA	0
Historical resources	F	F	F	B
Biological resources				
Flora	VG	G	G	0
Fauna	VG	G	G	0
Geological resources	NA	NA	NA	0
Ecological systems	VG	G	G	0
Water quality	G	G	G	0
Air quality	G	G	G	0
Land quality	G	F	G	B
Sound quality	VG	G	G	0
Visual quality	G	F	G	B

[a/] Effect of plan is difference in quality between future without the project (no plan) and future with project (plan).

Quality

VP - very poor
P - poor
F - fair
G - good
VG - very good
NA - not applicable

Effect

SA - strongly adverse
A - adverse
0 - no effect
B - beneficial
SB - strongly beneficial

C-064684

Recreation Commission have proposed converting the railroad grade to a trail, as part of the "Rails to Trails Project." A conflict with vehicular access could develop depending on how far the trail concept is extended.

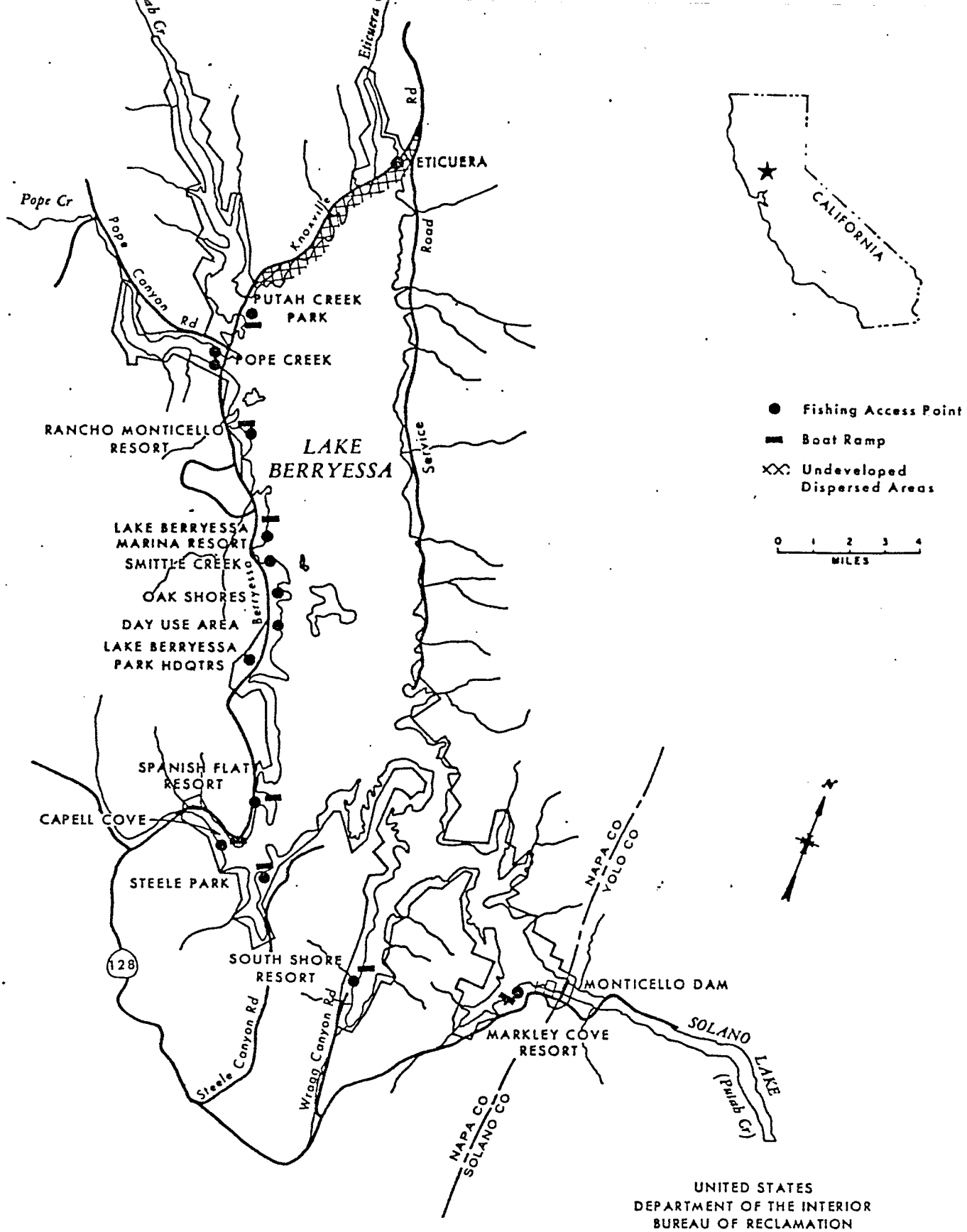
Two points along the railbed offer good potential for parking and shore access. In addition, there is a large gravel bar at Motion Creek, a rather scenic area which has room for 5-10 cars. Spring runoff may make the area inaccessible for a short period, but proper culvert placement could minimize the problem. It would be desirable to allow access to this area without spoiling the natural surroundings. Consequently, only trash cans and a portable toilet are needed for this area. Car-top boat launching is possible at the site.

LAKE BERRYESSA (MONTICELLO DAM)

Use at Lake Berryessa (figure 23), a Bureau of Reclamation lake, is expected to increase considerably over the next 10 years. Current access to the lake for the purpose of fishing is quite good in terms of number of opportunities; however, as pressure increases, the quality of those access points must be upgraded to adequately handle the load. Roadside turnouts have been provided all along the west side road from Capell Cove up to the north end of the lake. A little better than half of the turnouts have been set up with barriers to control parking and limit shore access to foot traffic. Continuation of this barrier control program is necessary to prevent resource damage and provide attractive boundary definition for easy identification by visitors. Continued improvement of these areas will help disperse use and reduce pressure on day-use areas.

Sanitation facilities at these areas are minimal, most having none at all. As use increases, sanitation will become a problem. Portable toilets should be provided at intervals to increase visitor comfort and avoid resource damage.

The fishing access area located at the north end of the Pope Creek bridge will require redevelopment. Heavy use by socializing teenagers precludes the use of a nice stretch of bank by serious anglers. This parcel's large size and uncontrolled use encourages congregation of rowdy crowds. The site should be improved in such a manner as to eliminate uncontrolled parking and encourage use by anglers. Through landscape design, elimination of the potential for large crowds will reduce



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LAKE BERRYESSA

FIGURE 23

litter and damage to the bank and promote fishing and other desirable shore activities in a manageable setting. A conceptual design has been developed for improvement of the area; see figure 24 and tables 14 and 15.

Roadside turnouts for fishing access also are located along the south shore from the Markley Cove area to Monticello Dam. Their development should follow that described for similar areas on the west shore.

Upgrading existing sanitary facilities currently used by anglers is advised at the park headquarters' visitor center and at the Eticuera area. Flush units at the visitor center where water is available, and self-contained, flushing units at Eticuera, where it is not, are needed.

Boat launch facilities on Lake Berryessa are capable of filling the lake to its boating capacity. However, only one of eight ramps is public and free of charge, that being at Capell Cove. Resorts offer the bulk of the launch facilities at Berryessa. All charge a fee of about $5.00, subject to approval by the Bureau of Reclamation. The Capell Cove facility handles weekday traffic rather well, but cannot be expected to provide launching for all who seek it on a weekend. Because current agreements between the resorts and the Bureau of Reclamation preclude the development of competing facilities, it is probable that the development of additional launch sites will not be considered.

Stream fishing is essentially limited to Putah Creek below Monticello Dam. Eticuera Creek is only a trickle during summer, as is Putah Creek above the project.

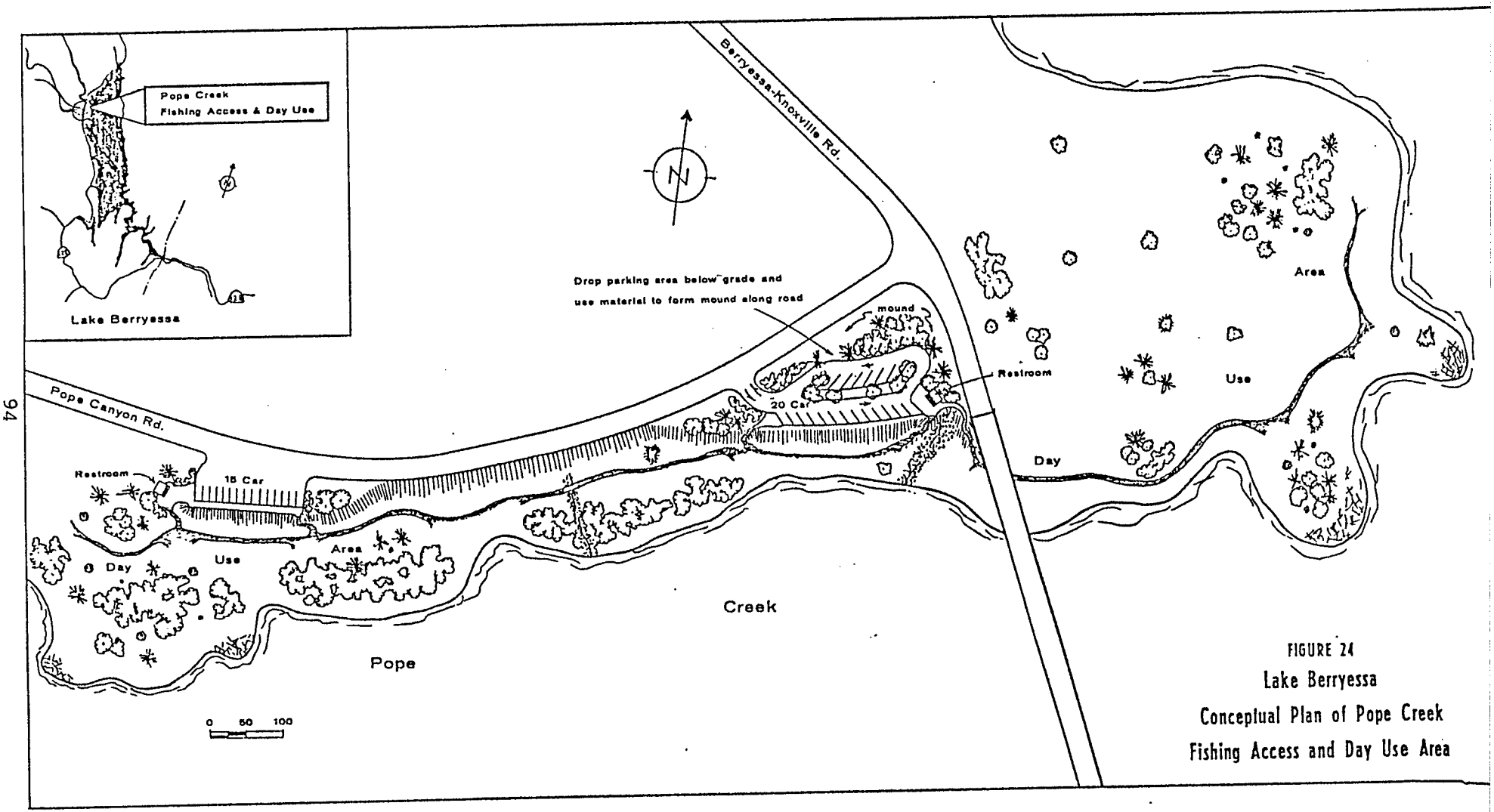


FIGURE 24
Lake Berryessa
Conceptual Plan of Pope Creek
Fishing Access and Day Use Area

C—064689

Table 14. Benefits and costs
Lake Berryessa, Pope Creek
fishing access and day-use area

Beneficial effects[a]	
Direct user benefits[b]	
Recreation	$ 78,000
Adverse effects	
Construction costs	175,000
Annual equivalent	
Federal investment	13,000
Annual operating cost	18,000
Total annual cost	31,000
Net project benefits	47,000
Benefit-cost ratio	2.5 to 1

[a] External economies and employment of unemployed resources not identified.
[b] Annual equivalent value for 100 years at 7-3/8 percent interest.

Table 15. Environmental quality impacts, Lake Berryessa, Pope Creek fishing access and day-use area

Environmental category	Present	Future		Effect of plan[a/]
		No plan	Plan	
Open space and greenbelts	P	VP	F	B
Streams and stream systems	NA	NA	NA	0
Lakes	G	G	G	0
Beaches and shores	F	F	G	SB
Wilderness, primitive, and natural areas	NA	NA	NA	0
Estuaries and wetlands	NA	NA	NA	0
Other natural beauty areas	NA	NA	NA	0
Archeological resources	NA	NA	NA	0
Historical resources	NA	NA	NA	0
Biological resources				
Flora	P	VP	F	B
Fauna	P	VP	F	B
Geological resources	NA	NA	NA	0
Ecological systems	P	VP	F	B
Water quality	G	G	G	0
Air quality	G	G	G	0
Land quality	P	VP	F	B
Sound quality	P	VP	F	B
Visual quality	P	VP	G	SB

[a/] Effect of plan is difference in quality between future without the project (no plan) and future with project (plan).

Quality

VP - very poor
P - poor
F - fair
G - good
VG - very good
NA - not applicable

Effect

SA - strongly adverse
A - adverse
0 - no effect
B - beneficial
SB - strongly beneficial

C-064691

Pope Creek is an attractive stream dropping down out of private land into the lake. An access road, approximately 2 miles upstream from the Pope Creek bridge on park land, is closed to the public. It has good potential for development and use by stream anglers; however, the fishery quality is questionable.

The fishery below the dam on Putah Creek is a good one. Access is extremely good from just below the spillway east to Lake Solano. Several fishing access points have been developed along this stretch providing safe, comfortable fishing opportunities with adequate parking and sanitation. They are managed by Yolo County.

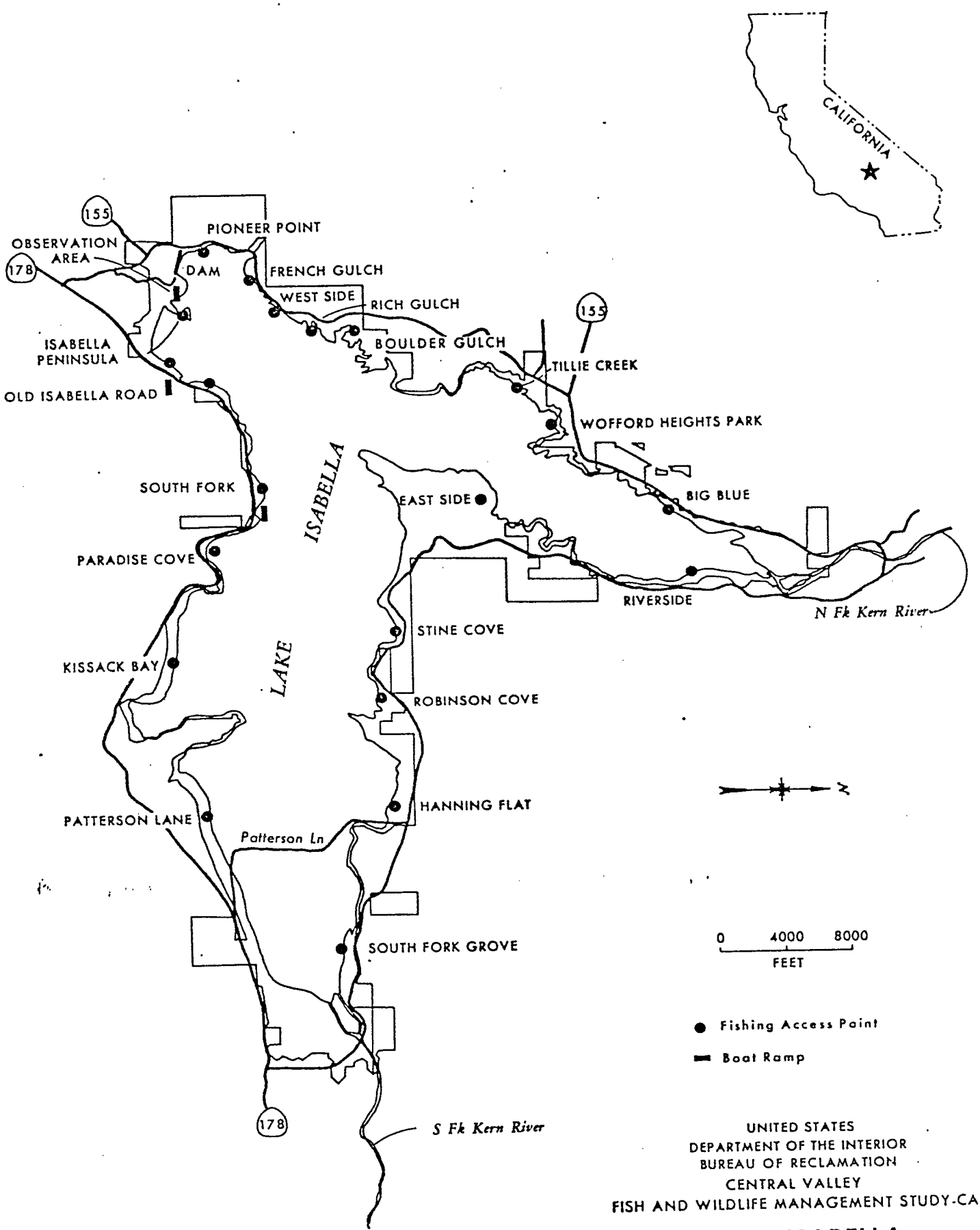
LAKE ISABELLA

Access for anglers on Lake Isabella (figure 25) is plentiful all around the lake. No major problems currently exist that limit fishing opportunity or degrade the experience. A future problem will be to limit access since the project is surrounded by roads which allow nearly complete access.

Eventually, when the resource capacity is reached, a means of limiting the number of users wil be required to prevent undue degradation. The problem probably will not become acute in this decade, but may before the turn of the century.

The one problem area identified by this investigation involves the Robinson Cove area. A parcel of private land extends almost to the shoreline and is being prepared for subdivision and development. Such development will close the area to anglers and visually degrade that corner of the lake. The Corps of Engineers' real estate office is aware of the problem, and an acquisition proposal has been made. To date, no action has been taken, but every effort should be made to press for a reconciliation of the problem before construction begins.

Good access opportunity exists on the Kern River upstream and downstream from Lake Isabella. Access to the south fork upstream from Lake Isabella is blocked by private holdings, but the north fork extends into U.S. Forest Service land with good access throughout. Downstream from the lake, access to the Kern River is possible via a Corps of Engineers campground and across more Forest Service land.



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LAKE ISABELLA

FIGURE 25

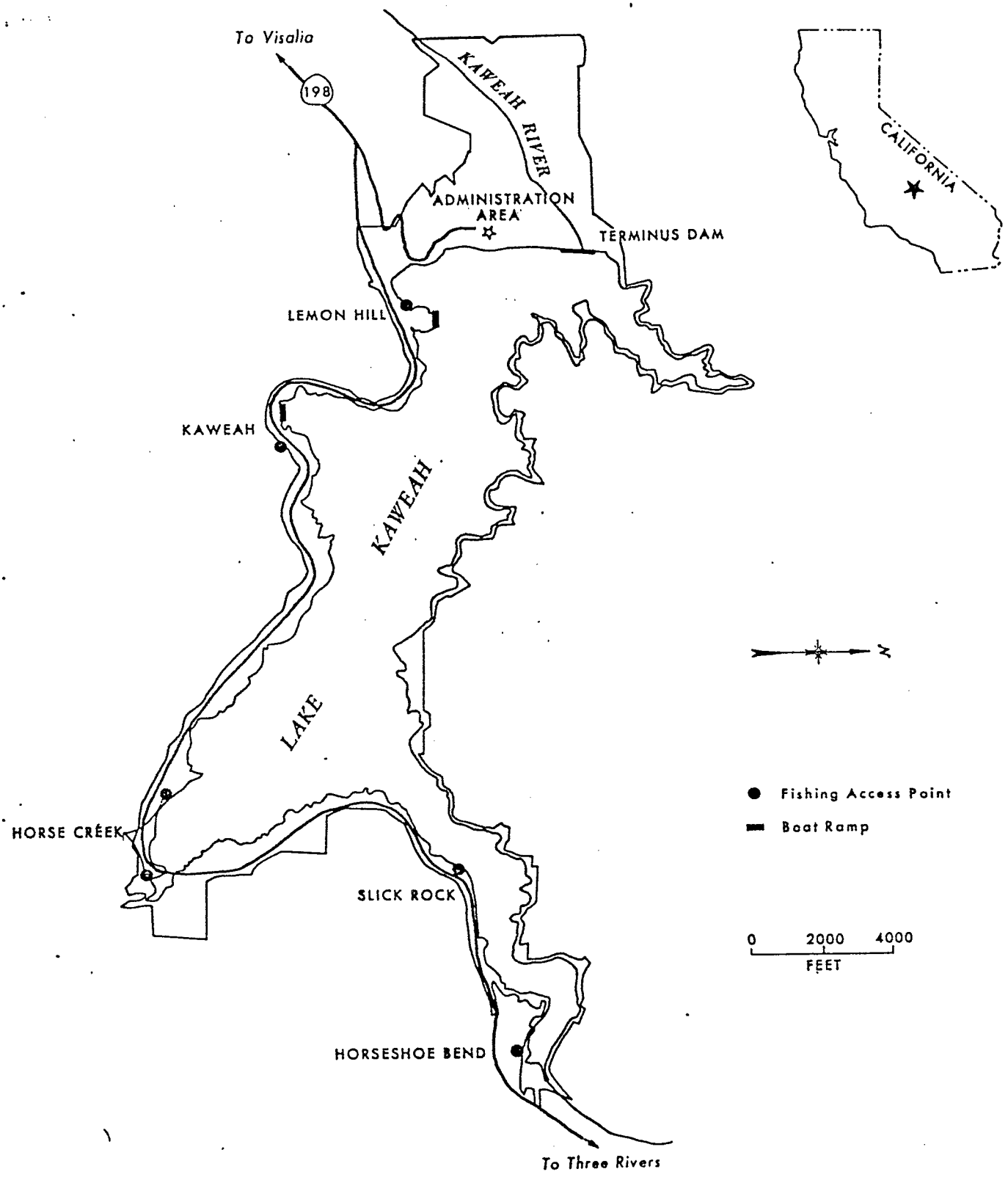
LAKE KAWEAH (TERMINUS DAM)

Recreation use at Lake Kaweah (figure 26) was projected in the 1976 master plan to reach maximum practical use of 550,000 recreation days in the year 2000. However, visitation in recent years has been around 600,000 recreation days. Consequently, it is not advisable to provide additional facilities aimed at extending use of the reservoir. However, improvements are advisable to provide safe and reasonably convenient access for those persons currently using the project.

Parking space available when the reservoir levels are high, during the peak use period, is not nearly adequate for existing demand. Day-users and boat launchers are forced to park, in violation of county law, along the shoulder of State Route 198. On weekends and holidays, cars are lined up for stretches of half a mile or more, even though there is very little room on the shoulder.

Route 198 serves National Park land above the project and heavy traffic presents a real hazard. There have been a number of accidents, but no fatalities to date. Law enforcement agencies responsible for the area have chosen to tolerate the situation. There is no place else to put those vehicles, and it would be impractical to issue citations to such large numbers of violators. The potential for serious injury exists and should be eliminated as soon as possible.

Additional parking has been outlined in the master plan, but not yet implemented. Additional parking would not provide space for increased visitation, but would allow safe parking in a reasonable location for those numbers of people already recreating in the reservoir area.



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LAKE KAWEAH

FIGURE 26

Parking at the Lemon Hill recreation area could be increased by 150 cars and 132 car-trailer spaces. Such an improvement would require extensive excavation, but has been identified in the immediate phase development plan by the Corps of Engineers.

Also planned in the immediate phase is improvement of the Kaweah recreation area. Additional high water parking for 90 car-trailer units is indicated. Also needed are redesign of the traffic access pattern and widening of the ramp by one lane to alleviate congestion during peak launch periods.

There are three forks of the Kaweah River entering the reservoir. At one time, the DFG stocked the river heavily. In recent years, stocking has been curtailed to a single point at Three Rivers. Access for stocking and fishing was historically allowed over private land. However, as use increased and abuses became more common, landowners systematically closed off access until a stocking program became impractical. Landownership patterns would have to be studied to determine the possibility of locating potential acquisitions or easements for access. At higher elevations, on National Park Service land, the river's forks become more accessible.

Also contributing to the stream's demise has been the serious increase of rough fish, notably the predacious squawfish. More study, and coordination with DFG, is needed to evaluate the feasibility of restoring the opportunity that once existed.

Downstream, not much opportunity exists. A private landowner has gained control of what was to be the Terminus Recreation Area immediately downstream from the dam, and beyond that the water is diverted into irrigation ditches.

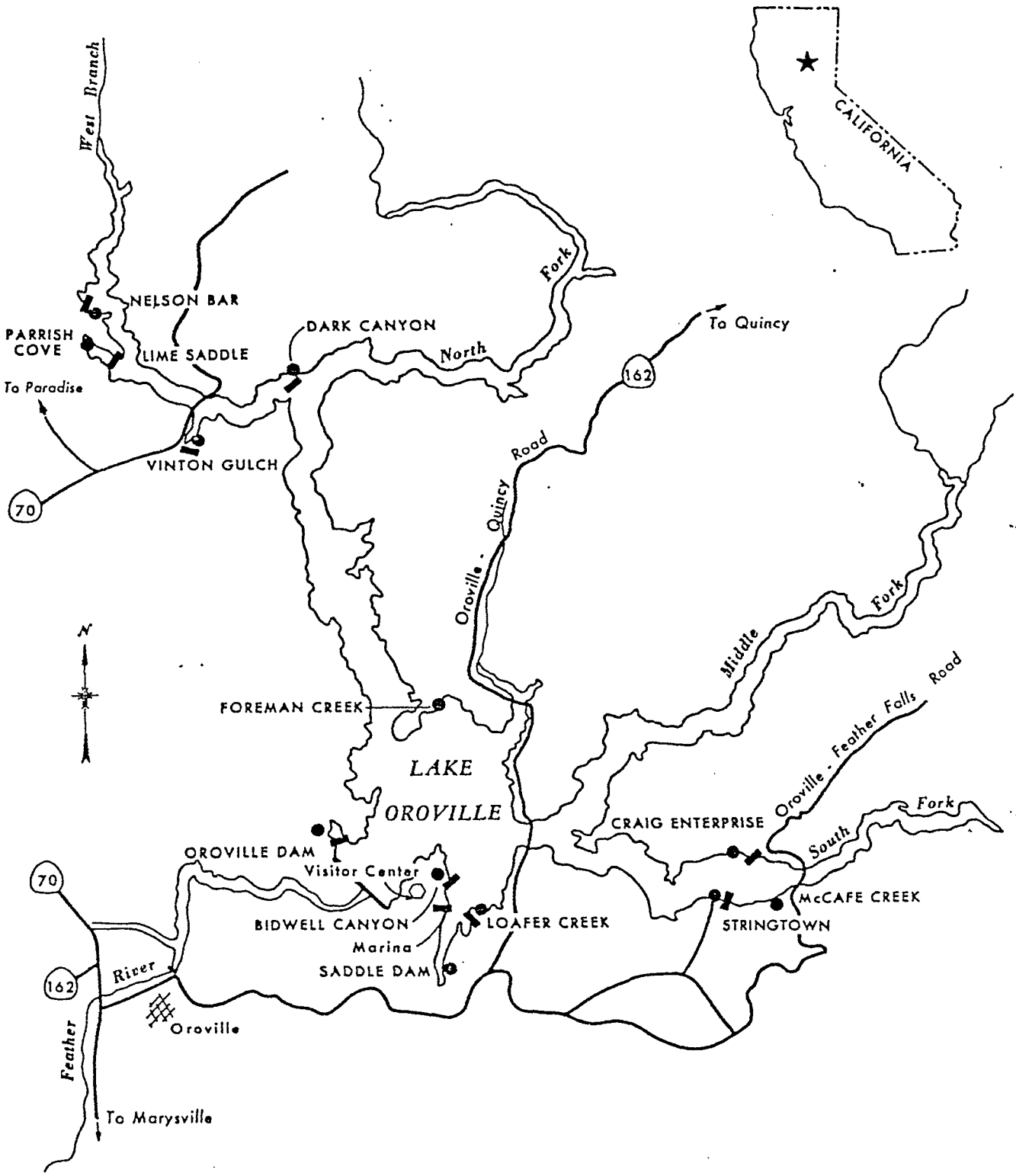
LAKE OROVILLE, THERMALITO FOREBAY, AND THERMALITO AFTERBAY

Lake Oroville, Thermalito Forebay, and Thermalito Afterbay are operated as a unit by the California Department of Parks and Recreation (DPR), and will be discussed together.

Lake Oroville

The banks of Lake Oroville (figure 27) are extremely steep and decent access is possible only in selected areas. There are no developable flats left in high-use areas, and cost-efficient development elsewhere will be difficult to plan. If use could be spread out evenly at existing access points, current opportunities would likely be sufficient. However, pressure for access is heavy in one particular area (Parrish Cove) now and is expected to increase drastically in another (Saddle Dam). People seeking access but turned away at these two points will be forced either to travel to other accesses or create their own. The former would be expensive and wasteful, and the latter, damaging to the resource.

The town of Paradise, a retirement community, is becoming larger every year. Access to the lake from that direction is via the Lime Saddle/Parrish Cove recreation area. It is currently receiving very heavy use and is not expected to be capable of handling more pressure in the coming years. Additional parking must be found or users will be forced to drive many extra miles to other access points. This is considered by management personnel to be the priority problem area on the project. People using the area for day-use, as well as a marina access, are often forced to park all over the access road, shoulder, and adjacent area. Inadequate parking is dangerous and damaging to the ground cover. Pacific Gas and Electric Company (PG&E) owns an adjoining 7-acre parcel above the current development which is no longer used; acquisition should be sought to augment current parking. Plans which PG&E may have for the parcel are unclear, but every effort should be made to arrange for the transfer.



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LAKE OROVILLE

FIGURE 27

The other area which soon will receive severe pressure is just above the Bidwell Bar Canyon Saddle Dam, which currently receives steady use. A parking area and access road are minimally maintained by DPR. The surrounding 80 acres have been subdivided, and subsequent development will place large numbers of anglers in the immediate area. If the area is not controlled, spontaneous use will degrade the resource and create a sanitation problem. Management recognizes the problem and support should be given to avoid a potentially serious situation. Details of conceptual site plan development are outlined on figure 28 and in tables 16 and 17.

The existence of a large retirement community all around the lake presents a special problem. The shoreline is so rugged that many aged or handicapped persons are unable to find a way to gain shore access for fishing. Provision of a courtesy dock is advisable, but severe lake level fluctuation makes it a difficult task. A DFG biologist, formerly assigned to Oroville, has suggested a courtesy dock at the dam that could accommodate changes in water level. Water conditions in that area attract good numbers of fish, and there are large numbers of senior and handicapped citizens who would benefit from such a dock.

Boat launching facilities on Oroville are considered adequate through the decade.

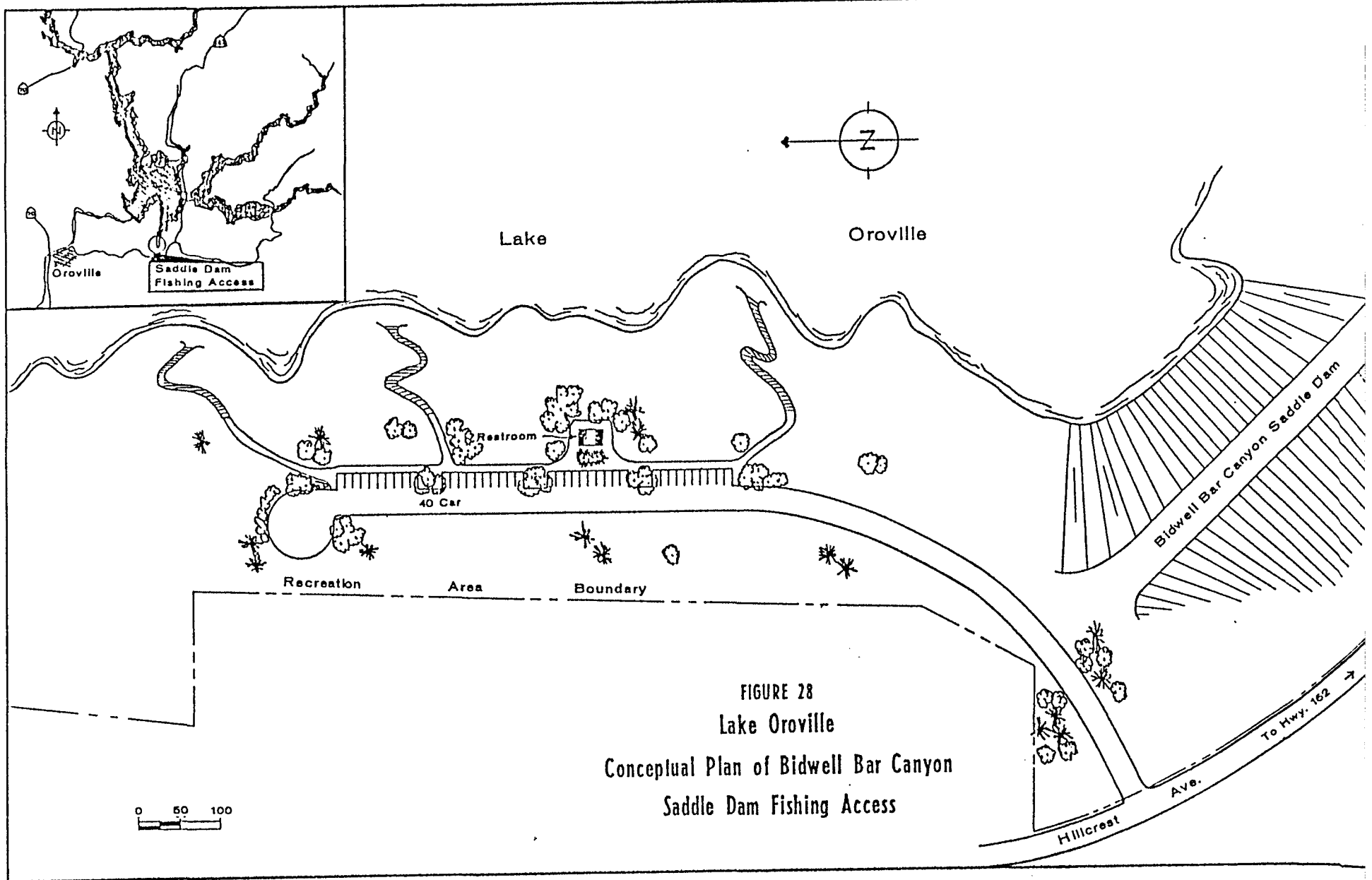


FIGURE 28

Lake Oroville

Conceptual Plan of Bidwell Bar Canyon

Saddle Dam Fishing Access

Table 16. Benefits and costs, Lake Oroville, Bidwell Bar Canyon Saddle Dam fishing access

Beneficial effects[a]	
Direct user benefits[b]	
Recreation	$ 96,000
Adverse effects	
Construction costs	155,000
Annual equivalent	
Federal investment	11,500
Annual operating cost	21,500
Total annual cost	33,000
Net project benefits	68,000
Benefit-cost ratio	2.9 to 1

[a] External economies and employment of unemployed resources not identified.
[b] Annual equivalent value for 100 years at 7-3/8 percent interest.

Table 17. Environmental quality impacts, Lake Oroville, Bidwell Bar Canyon Saddle Dam fishing access

Environmental category	Present	Future		Effect of plan[a]
		No plan	Plan	
Open space and greenbelts	G	F	F	0
Streams and stream systems	NA	NA	NA	0
Lakes	G	G	G	0
Beaches and shores	G	F	G	SB
Wilderness, primitive, and natural areas	NA	NA	NA	0
Estuaries and wetlands	NA	NA	NA	0
Other natural beauty areas	NA	NA	NA	0
Archeological resources	G	G	G	0
Historical resources	F	F	F	B
Biological resources				
Flora	F	P	G	SB
Fauna	F	P	F	B
Geological resources	NA	NA	NA	0
Ecological systems	F	P	F	B
Water quality	G	G	G	0
Air quality	G	G	G	0
Land quality	F	P	G	B
Sound quality	G	F	F	0
Visual quality	G	F	G	SB

[a] Effect of plan is difference in quality between future without the project (no plan) and future with project (plan).

Quality	Effect
VP - very poor	SA - strongly adverse
P - poor	A - adverse
F - fair	0 - no effect
G - good	B - beneficial
VG - very good	SB - strongly beneficial
NA - not applicable	

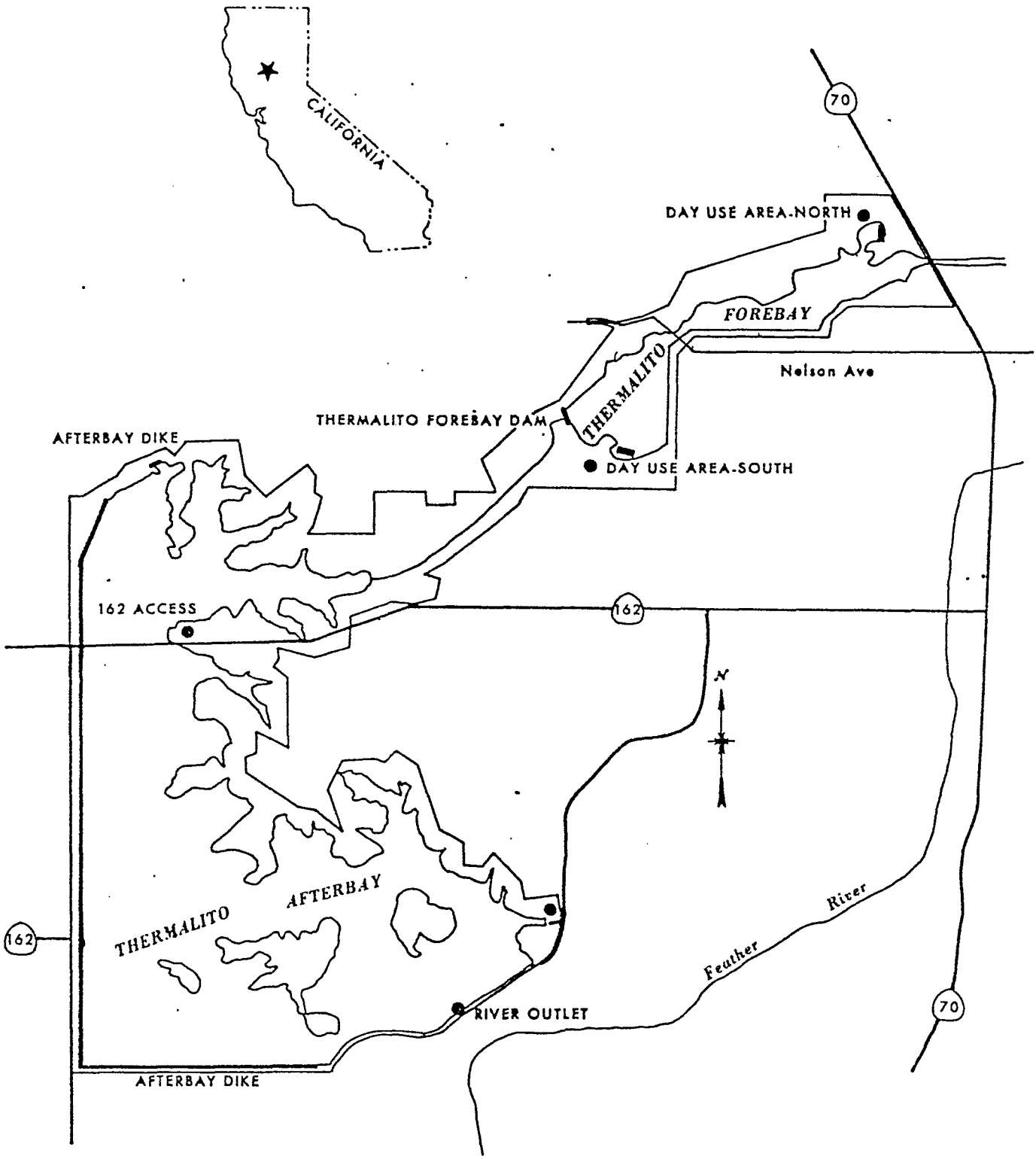
Thermalito Forebay and Thermalito Afterbay

Boat launching facilities on Thermalito Afterbay (figure 29), a neglected resource, are not considered adequate. The DWR plans to turn the afterbay over to the DPR for recreation management after the DPR acquires funds for operation and maintenance. As recreational use on Lake Oroville becomes heavier, alternative recreation sources, such as the afterbay must be utilized. After the afterbay is turned over to the DPR, a boat ramp and sanitation facilities should be provided. The problem has been reviewed, and a proposal for development is available through the California Department of Boating and Waterways. The conceptual plan for this development is summarized on figure 30 and in tables 18 and 19.

The public currently attempts to launch boats into the afterbay on the old road leading into the water along the north side of Route 162. The slope is, however, not great enough to accept a boat without backing its trailer a great distance into the water. The afterbay is large, and development of an access and launch site is desirable.

The forebay (also shown on figure 29), which is split by a bridge, has launch facilities on both halves. It does not receive much boat or shore pressure, and access is considered adequate.

Headwaters above Lake Oroville include the middle fork and the north, south, and west forks of the Feather River. These streams have been under Wild and Scenic Rivers designation and the river canyons are extremely rugged, thus making access development tremendously difficult, as well as undesirable.



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THERMALITO FOREBAY AND AFTERBAY

FIGURE 29

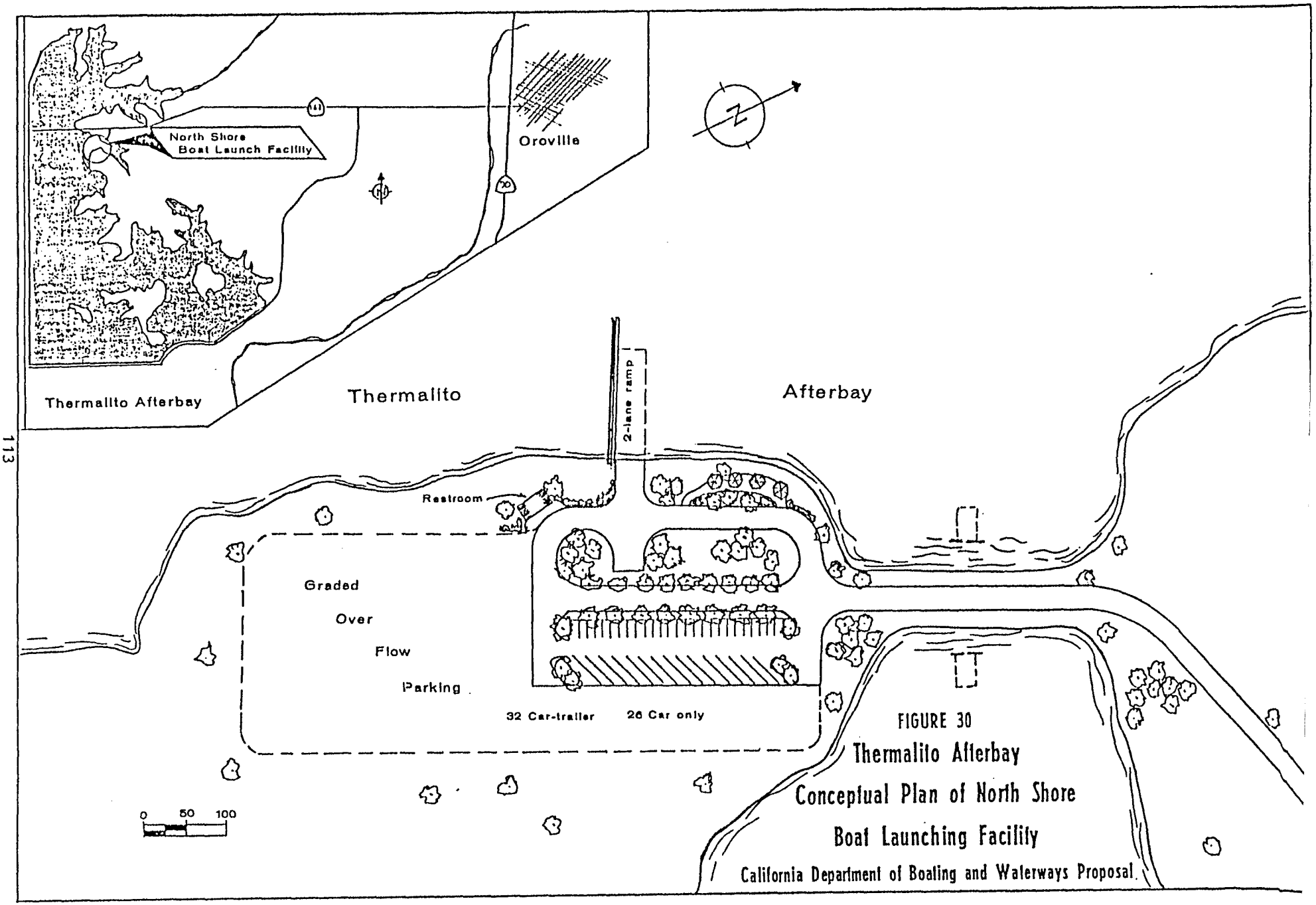


FIGURE 30
Thermalito Afterbay
Conceptual Plan of North Shore
Boat Launching Facility
California Department of Boating and Waterways Proposal

C—064708

Table 18. Benefits and costs, Thermalito Afterbay, north shore boat launching facility

Beneficial effects[a]	
Direct user benefits[b]	
Recreation	$ 74,000
Adverse effects	
Construction costs	490,000
Annual equivalent	
Federal investment	36,000
Annual operating cost	16,000
Total annual cost	52,000
Net project benefits	22,000
Benefit-cost ratio	1.4 to 1

[a] External economies and employment of unemployed resources not identified.
[b] Annual equivalent value for 100 years at 7-3/8 percent interest.

Table 19. Environmental quality impacts, Thermalito Afterbay north shore boat launching facility

Environmental category	Present	Future		Effect of plan[a]
		No plan	Plan	
Open space and greenbelts	G	F	P	A
Streams and stream systems	NA	NA	NA	0
Lakes	G	G	G	0
Beaches and shores	G	F	G	B
Wilderness, primitive, and natural areas	NA	NA	NA	0
Estuaries and wetlands	NA	NA	NA	0
Other natural beauty areas	NA	NA	NA	0
Archeological resources	NA	NA	NA	0
Historical resources	NA	NA	NA	0
Biological resources				
Flora	F	P	F	B
Fauna	F	P	F	B
Geological resources	NA	NA	NA	0
Ecological systems	F	P	F	B
Water quality	G	G	G	0
Air quality	G	G	G	0
Land quality	G	F	G	SB
Sound quality	G	G	F	A
Visual quality	G	F	G	B

[a] Effect of plan is difference in quality between future without the project (no plan) and future with project (plan).

Quality	Effect
VP - very poor	SA - strongly adverse
P - poor	A - adverse
F - fair	0 - no effect
G - good	B - beneficial
VG - very good	SB - strongly beneficial
NA - not applicable	

Access development is curtailed not only by the topography of the area, but also by the prohibitive expense associated with constructing and maintaining roads in such a rugged terrain. In addition, various sections of the river offer a unique wildlife experience where it is preferable to leave the terrain undisturbed. Moreover, the Middle Fork of the Feather River is one of the original components of the National Wild and Scenic Rivers system and thereby deemed protected by Congress against actions which would adversely affect Wild and Scenic values.

Access to the Thermalito diversion pool between Lake Oroville and the forebay is by trail from the visitor center. It is considered adequate.

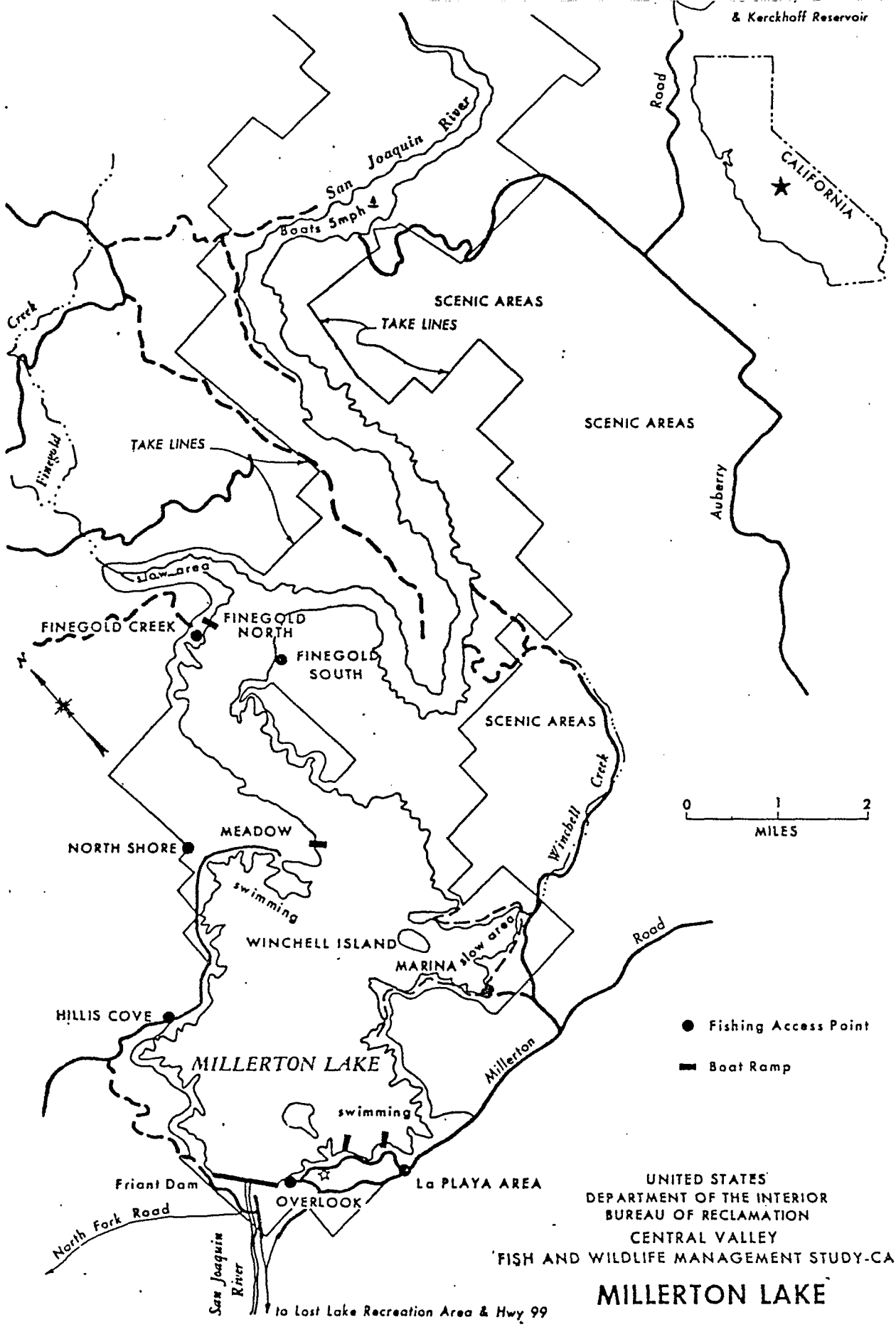
The river leading out of the afterbay has "unofficial" access at numerous points within the Department of Fish and Game's Oroville Wildlife Area. This area encompasses the entire river above and below the afterbay for several miles. This stretch of river is also of a wild and scenic nature.

MILLERTON LAKE (FRIANT DAM)

Development at the area operated by the California Department of Parks and Recreation at Millerton Lake (figure 31), behind Friant Dam, is drastically impaired by the minimal acreage within the take line (project boundary). In some areas, just 50 feet of land distance separates the high water mark from private property. Surrounding land is beginning to be subdivided, threatening the esthetic value of the area. That development also will reduce the extent of shoreline suitable for shore anglers who prefer a natural setting.

Recreation developments on the north shore and the south shore are limited. Camping pressure along the north shore leaves only a few parking spaces available for day use. At high water levels, which occur during the middle of the recreation season, parking is scarce. At that time, just 25 day-use spaces are available along the north shore road; 30 are available along the south shore road. The reservoir, an extremely popular recreation spot for Fresno, Madera, and Merced residents, sustains heavy use. Weekend turn-aways occur 2 to 3 times per year and will increase as area population expands.

Alleviation of the parking problem existing when the water is high is the most outstanding problem needing attention at Millerton. There is, however, no public land for expansion. In order to accommodate the probable increased pressure in the 80's, additional land must be acquired. Proposals have been submitted by management which would help guarantee the integrity of campgrounds on the north shore (see Appendix E). In addition, the State is considering the acquisition of a 1,500-acre parcel



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MILLERTON LAKE

FIGURE 31

on the north side. A redevelopment project is underway on the south shore. Scheduled for completion by September 1984, the project includes two new comfort stations, landscaping, a bypass road, and supporting utilities. The project will cost about $1.1 million.

Recreation at Millerton will be severely imperiled if housing developments encroach on lake facilities. Apparently, county policy does not preclude small lot development. The esthetic degradation as well as barriers to shoreline access that could result are a threat to the total value of the fishing experience. Acquisition may prove expensive, but without it, recreational development will be stunted and the total recreation experience diminished. Thus, a publicly funded project may come to resemble a private lake. Acquisition, development, and management of the north and south shore parcels would allow for controlled expansion of day-use as well as overnight facilities.

At one time, DPR allowed night fishing on all parts of the reservoir. Vandalism and other crimes after dark became severe and all areas but one were closed. Over-taxed day use could be alleviated somewhat if more night fishing were allowed, but manpower is not available to deter crime. If funding for additional manpower could be obtained and a management agreement reached between DPR and the Bureau of Reclamation, the Friant Dam overlook would provide good night fishing access.

At medium and low lake levels, visitors have historically driven vehicles below the high water mark where they often got stuck. Identifiable lower level parking lots should be established with portable toilets nearby.

Access to the San Joaquin River above the reservoir is available from BLM land with parking and trail heads at the end of Smalley Road. Above that point, the river comes out of Kerckhoff Reservoir.

Downstream from Millerton Lake, flows are maintained to sustain a trout fishery stocked regularly by DFG. Consistent use occurs just below the dam where the San Joaquin River crosses North Fork Road. The area is not maintained by either Madera or Fresno Counties and has become unattractive due to litter and large sections of concrete abutment from the old bridge. The DPR has suggested that through an agreement with the Young Adult Conservation Corps and the two counties the abutments be blown up and some of the resultant rubble used to create stream riffles. Fresno County has been amenable to the idea, but Madera County has been reluctant to provide funding or risk liability. The area has good potential, but faces further deterioration without proper management. The agreement suggested by the DPR should be implemented. Also, rubbish receptacles and portable toilets would be desirable. Barriers to control unrestricted vehicular access would reduce vegetation damage and erosion. A conceptual fishing access site plan for this area is shown on figure 32. The related benefit-cost information and environmental quality impacts are summarized in tables 20 and 21, respectively.

If this area is allowed to deteriorate, the public will lose access to a well-stocked fishery. About 2 miles downstream from the dam, river access is available only from Lost Lake Recreation Area. After that, the stream crosses private ranch land all the way down to Highway 99, a distance of about 15 miles.

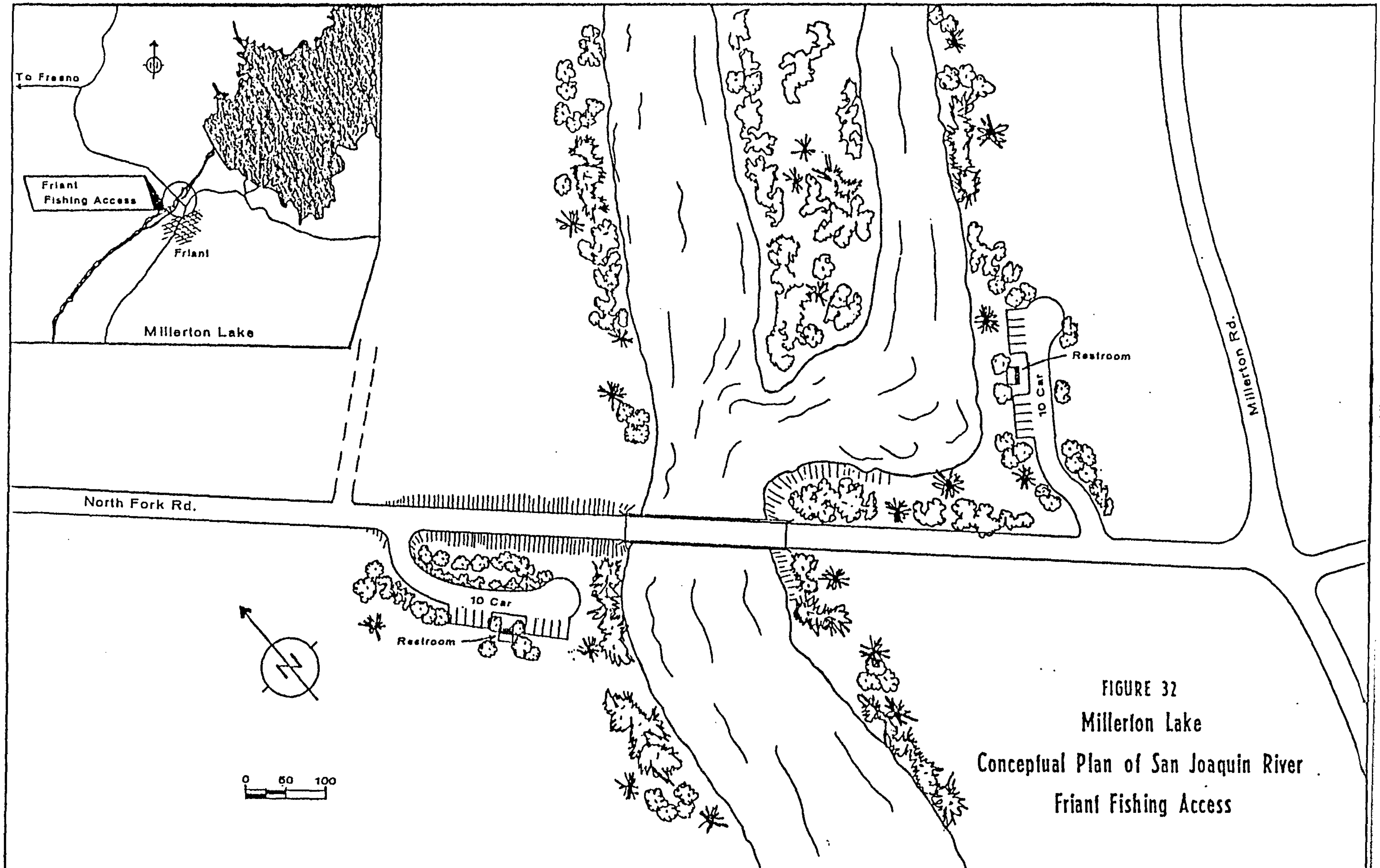


FIGURE 32
Millerton Lake
Conceptual Plan of San Joaquin River
Friant Fishing Access

Table 20. Benefits and costs, Millerton Lake, San Joaquin River, Friant fishing access

Beneficial effects[a]	
Direct user benefits[b]	
Recreation	$ 22,000
Adverse effects	
Construction costs	140,000
Annual equivalent	
Federal investment	10,000
Annual operating cost	5,000
Total annual cost	15,000
Net project benefits	7,000
Benefit-cost ratio	1.5 to 1

[a] External economies and employment of unemployed resources not identified.
[b] Annual equivalent value for 100 years at 7-3/8 percent interest.

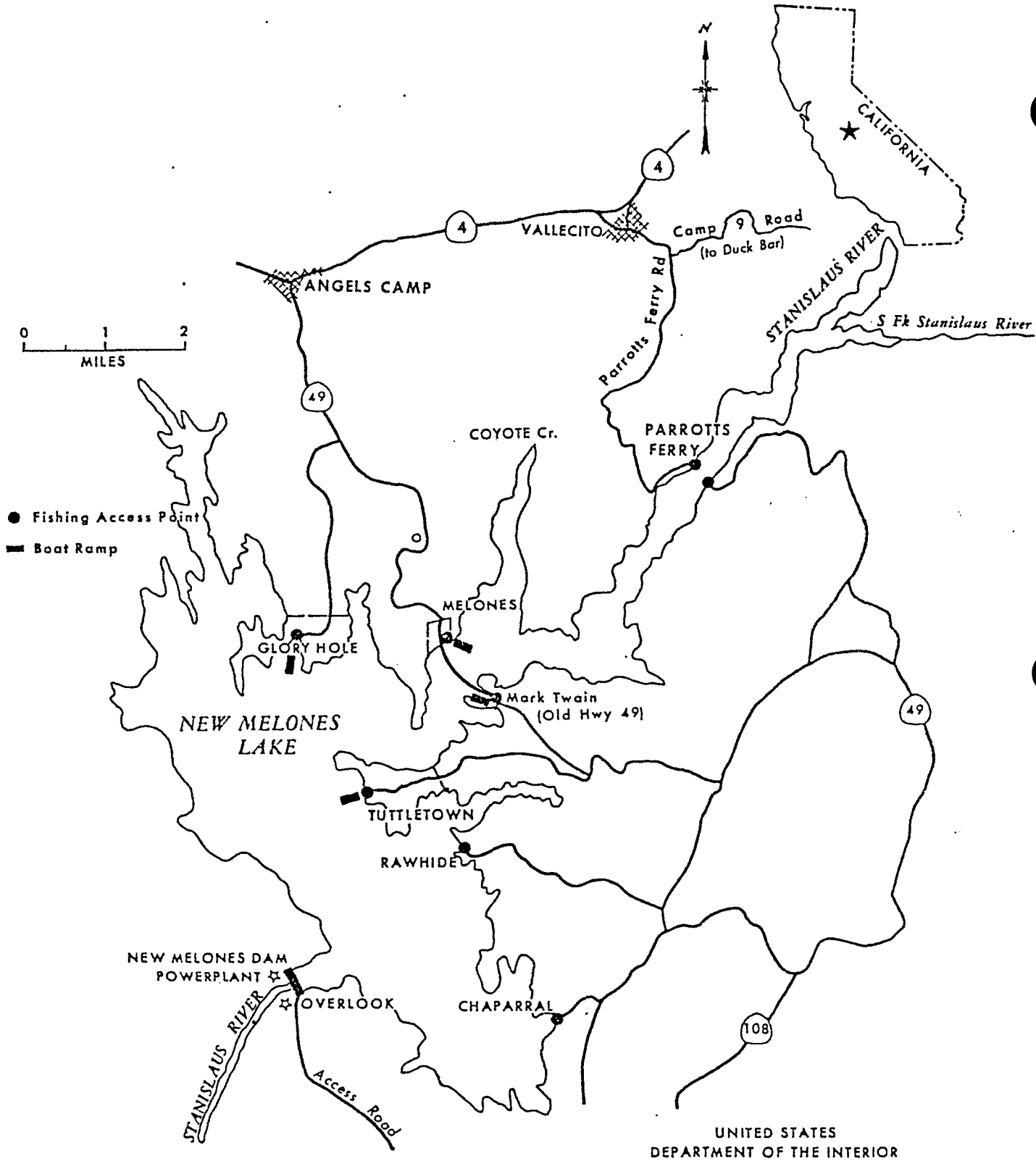
NEW MELONES LAKE

Recreation development at New Melones Lake (figure 34) began in 1981 and initial facilities were completed in the fall of 1982. Construction of additional facilities depends on availability of funding. Initial development will provide day-use and launch facilities at the Parrotts Ferry, Mark Twain (Old Highway 49), Glory Hole, and Tuttletown sites. Day-use facilities will also be provided at the Coyote Creek area which will be reached by boat and hiking trail only.

Plans for future development include seven additional sites. However, initial development, when implemented, will be extensive and should satisfy demand through the year 2000.

During facility construction, interim policy will allow low density use of future recreation areas. At present, access is possible on existing roads leading to Glory Hole, Tuttletown, Rawhide, Chaparral, Parrotts Ferry, and Mark Twain (Old Highway 49). Boats can be launched at the Old Highway 49 site; sanitary facilities at the sites have been provided by the Bureau of Reclamation and Bureau of Land Management. These sites should provide adequate public access for anglers until additional facilities are installed.

The Stanislaus River, renowned for its white water rafting, was partially inundated by the lake when it was filled. Currently, an excellent fishery exists in the lake. Above the project, access can be gained via the PG&E Camp 9 Road and on the Bureau of Reclamation Duck Bar and South Fork Roads. Below the project no access is permitted within



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NEW MELONES LAKE

FIGURE 34

the take line due to powerplant operations. Beyond the take line, Tulloch Dam (about 7 miles downstream) backs water up to New Melones Dam.

PINE FLAT LAKE

Pine Flat Lake (figure 35) has problems stemming from a very narrow take line as well as from prohibitive terrain. The lake is boat-oriented, but lack of available parking limits its use. At high water very little parking of any kind exists and turn-aways are common. The remaining land area is too sloped for further expansion near existing facilities.

Bank anglers at the more accessible west end of the lake have few opportunities at high water, as boaters occupy what little parking exists. However, farther east around the lake, Forest Service day-use areas at Trimmer and Sycamore Creek receive light pressure and space is readily available. Access is generally adequate at middle and lower lake elevations all around the lake.

Some relief from high water conditions must be found. These currently present a control nightmare; anglers face exclusion when water reaches high pool. The Pine Flat master plan includes launch and day-use development at Windy Gap and Sycamore Creek. Funding is not available for full development of these areas, nor is it deemed by the management to be wise at this time. However, preliminary development of basic launch and parking facilities would provide additional areas at high pool. They are currently blocked off and could remain so at low and middle lake levels.

The Kings River below Pine Flat can be reached via county road for approximately 1-1/2 miles, then there is a short stretch of private land, and then back to county access for 3/4 mile. Below that point, the river courses through private land.

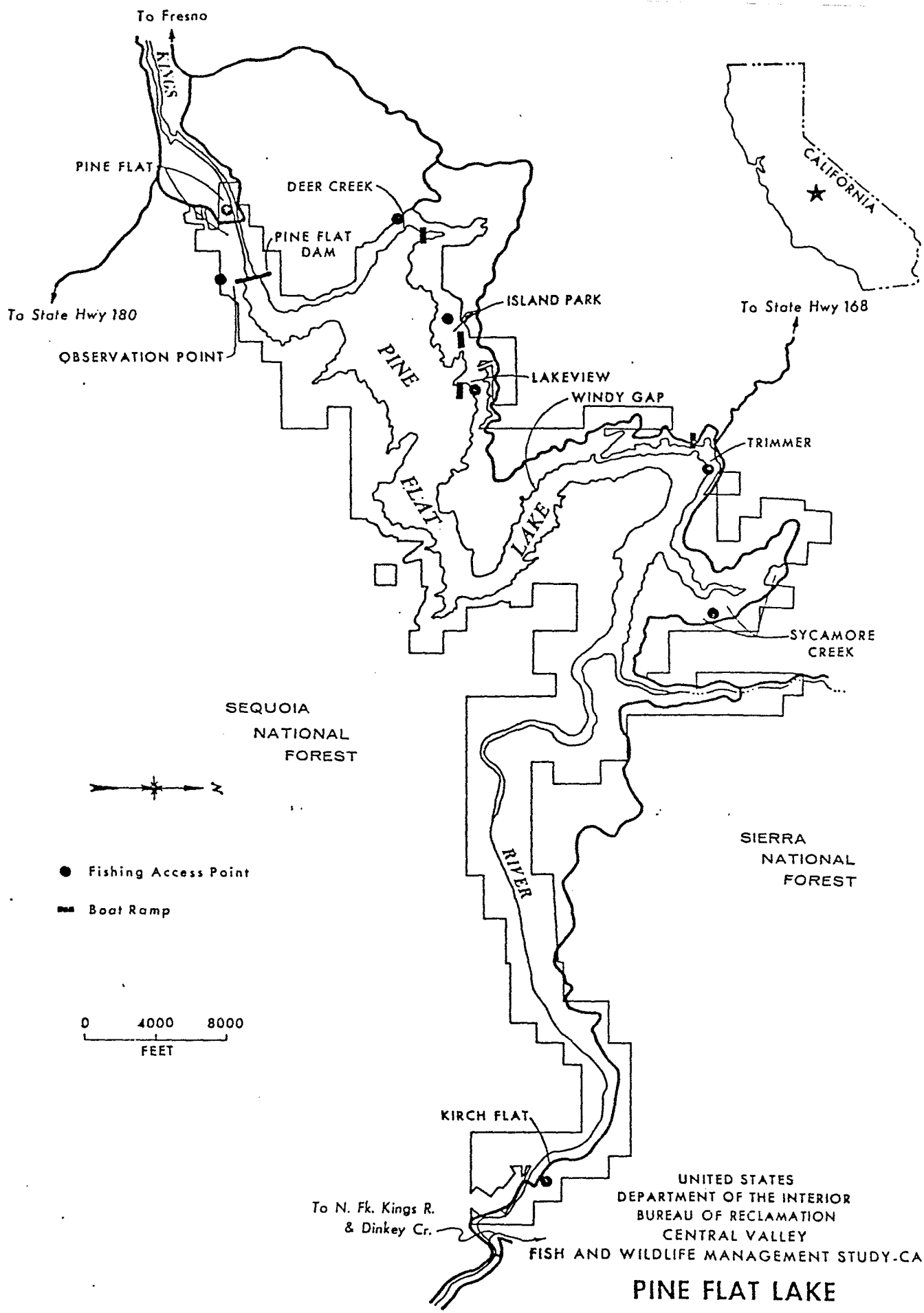


FIGURE 35

Above the project, good access exists to the Kings River across Forest Service land within Sequoia National Forest and to Big Creek within Sierra National Forest.

Dinkey Creek, emptying into the north fork of the Kings River, has walk-in access only due to severe topography. All other creeks entering Pine Flat Lake are intermittent and do not support viable fisheries.

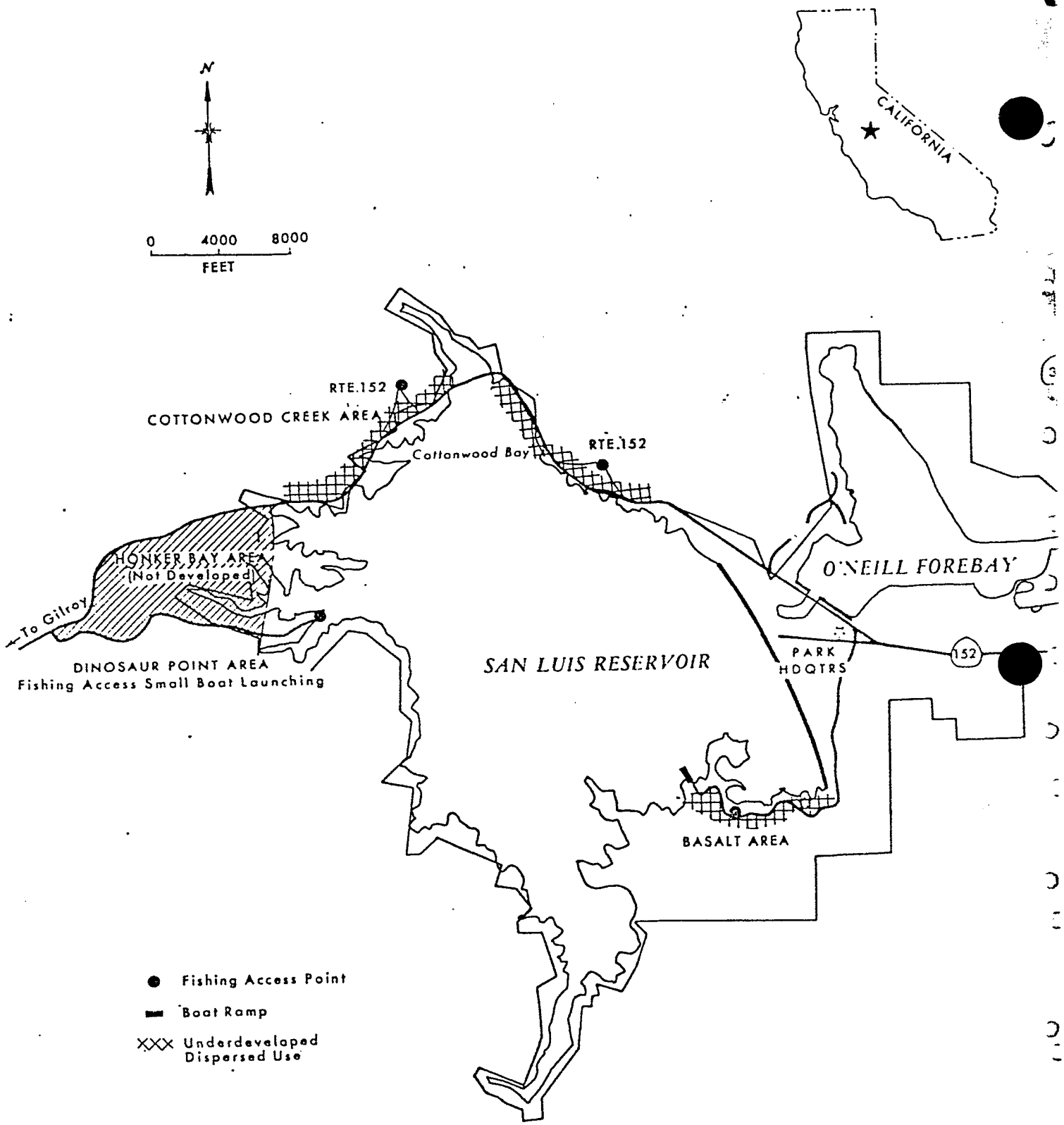
SAN LUIS RESERVOIR AND O'NEILL FOREBAY

San Luis Reservoir

Access for fishing on San Luis Reservoir (figure 36) is fairly extensive and in most cases adequate. The DPR-operated launching facility at the Basalt area is in need of improvement. The improvement is underway and will continue as funding is provided. The Dinosaur Point launching facility is also in need of improvement to deal with the extreme fluctuations in water level. Plans for improvement of this launch facility have been made and also will be instituted as funds become available. With these improvements, launching capability is expected to be adequate through the 1980's.

Route 152, which bounds the north shore of San Luis Reservoir, was reviewed due to its unique access problems. Roadside turnouts have been provided at several points to prevent arbitrary parking for fishing access. From a management standpoint, these turnouts are undesirable because of a lack of manpower and facilities. To monitor an entrance and collect fees would require additional development. These turnouts have been provided to satisfy local demands and were not part of the master plan. From an angler's standpoint, they provide convenient access to otherwise inaccessible portions of the reservoir, free of charge.

One section of Route 152 crosses the reservoir at the Cottonwood Creek area. The arm transected is fairly deep and relatively unaffected by drawdown. Turnouts at either end of the road at this crossing would allow access to a potentially good area.



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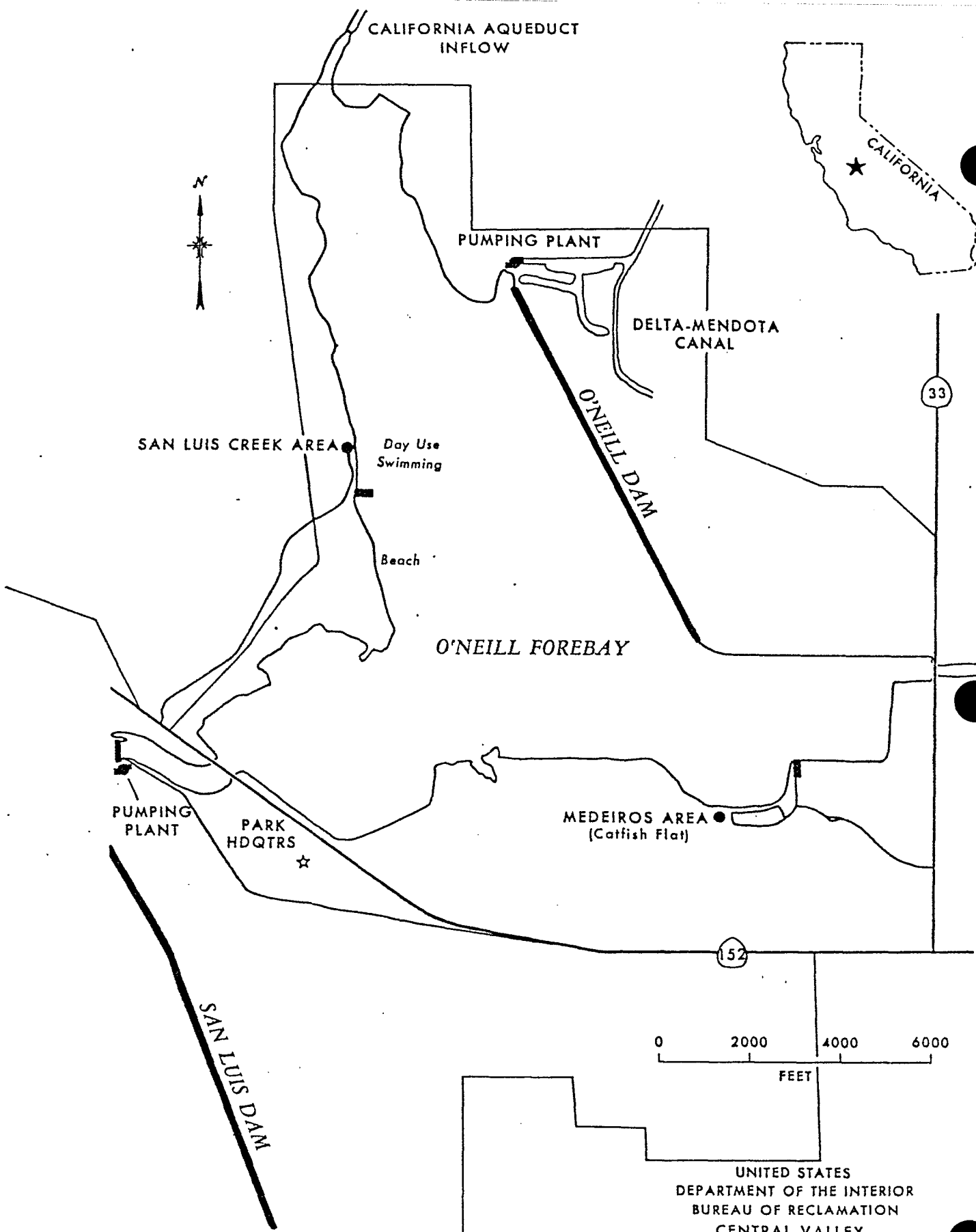
SAN LUIS RESERVOIR

FIGURE 36

O'Neill Forebay

Access to O'Neill Forebay (figure 37) is largely predicated on the weather. The road leading north from the San Luis Creek day-use area is unimproved all the way up to the aqueduct inlet at the extreme north end of the forebay. During the winter, rain forces periodic closing of the area to anglers. Attempts have been made to stabilize the road with gravel. Results have been partially successful, but a permanent solution requires hardening with asphalt or chip sealing. A similar condition exists in what is referred to as the Catfish Flat area along the south shore. Hardening of this road would also help control random driving over the area, which currently occurs to the detriment of vegetation. Also, the road leading to this area from Highway 33, which was once asphalted, is now badly potholed and in need of resurfacing. These road problems, interfering with consistent open access, are recognized by management, but funding has not been made available for their correction.



O'NEILL FOREBAY
FIGURE 37

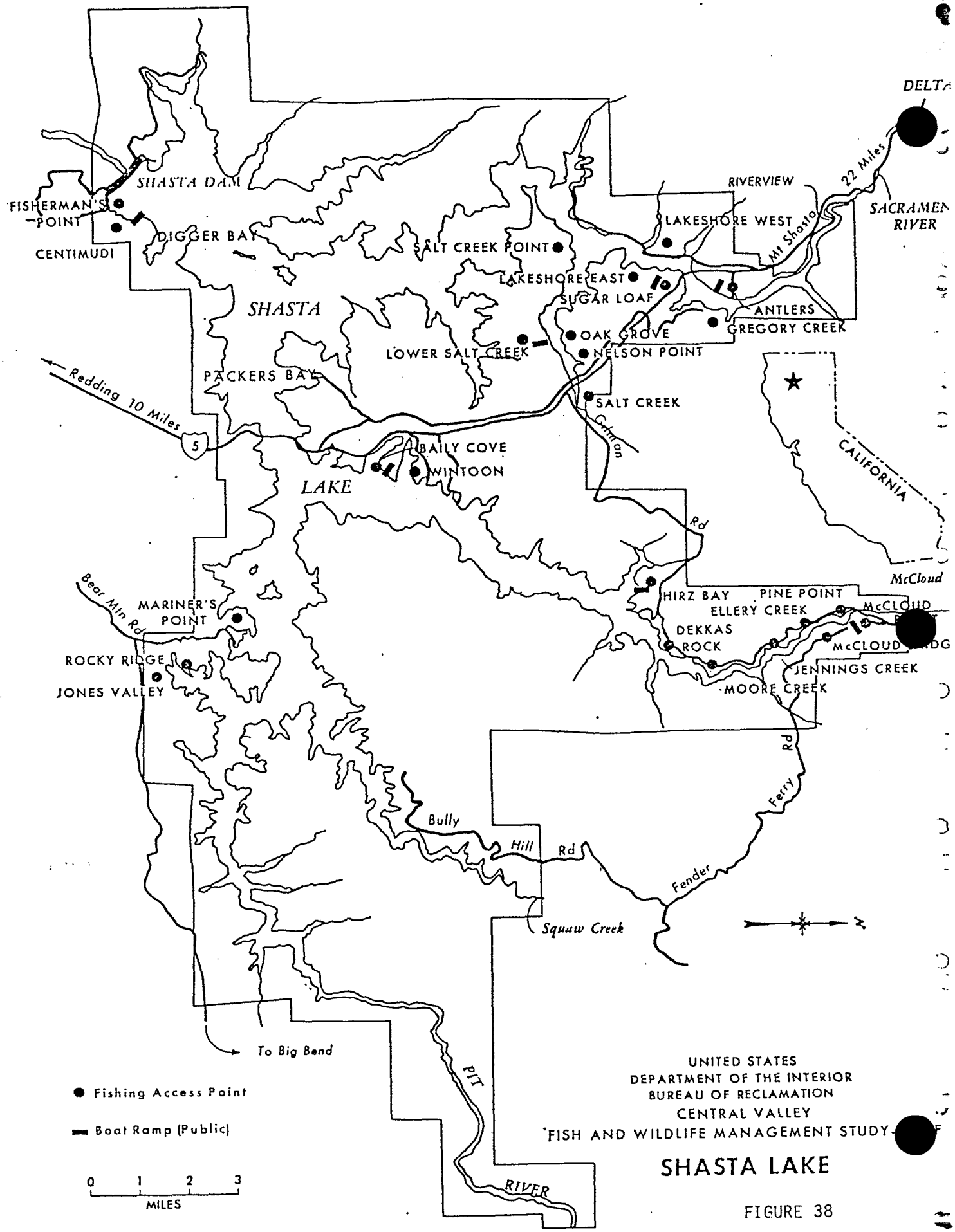
SHASTA LAKE

Most of the shoreline of Shasta Lake (figure 38) is accessible only by boat. Shore fishing is concentrated at the access points, particularly near the dam. Twenty-one percent of the May and June 1983 use was from shore. Most fishing is for salmonids, which do not depend on shoreline habitat.

U.S. Forest Service officials believe that access to shoreline fishing is quite adequate considering the condition of the fishery. Trail systems have been suggested at day-use areas and campgrounds to help disperse anglers and provide better access when the reservoir is nearly full. Trails constructed through the manzanita would greatly improve access in many areas.

The lack of cover for fish limits the survival of young centrarchids (sunfish, bass, black crappies). Fish tend to congregate under structures which provide shade and some cover and anglers are generally more successful fishing in these areas. Consequently, a few old docks have been converted to floating fishing piers to improve bank fishing possibilities. The Forest Service would like to include a stipulation for provision of such fishing docks at all concessionaire facilities. Hopefully, as contracts are rewritten, such a stipulation will be included. It will take time and will only occur when and where it can be worked out as existing contracts are renewed.

Essentially, shore access should be adequate through this decade. Boat traffic on the lake will reach what the Forest Service considers capacity, using existing facilities. Since the Forest Service feels that



the existing ramps are capable of placing as many boats on the lake as is practical, no new ones are advisable.

Access to three of the four major headwater streams is generally good. The Sacramento River can be reached about 1-1/2 miles above Riverview at the Dog Creek crossing. Approximately 1/2 mile further upstream, access can be gained at Delta. Above that, occasional turnouts exist off the main road.

Squaw Creek can be reached for a distance of about 2-1/2 miles by a parallel road on Forest Service land. Farther upstream, Forest Service property offers a variety of additional access spots.

The Pit River has extremely steep banks with a PG&E dam located immediately above Shasta Lake's maximum pool. The first fishing access is above Pit 6 Reservoir, about 13 miles above Shasta Lake.

The one exception for access is the McCloud River. Just above the high water mark, private clubs control ownership for the first 15 miles upstream. The lands are patrolled and access to the public is nonexistent. Acquisition of this area could provide a unique angling experience largely in a wilderness setting.

SUCCESS LAKE

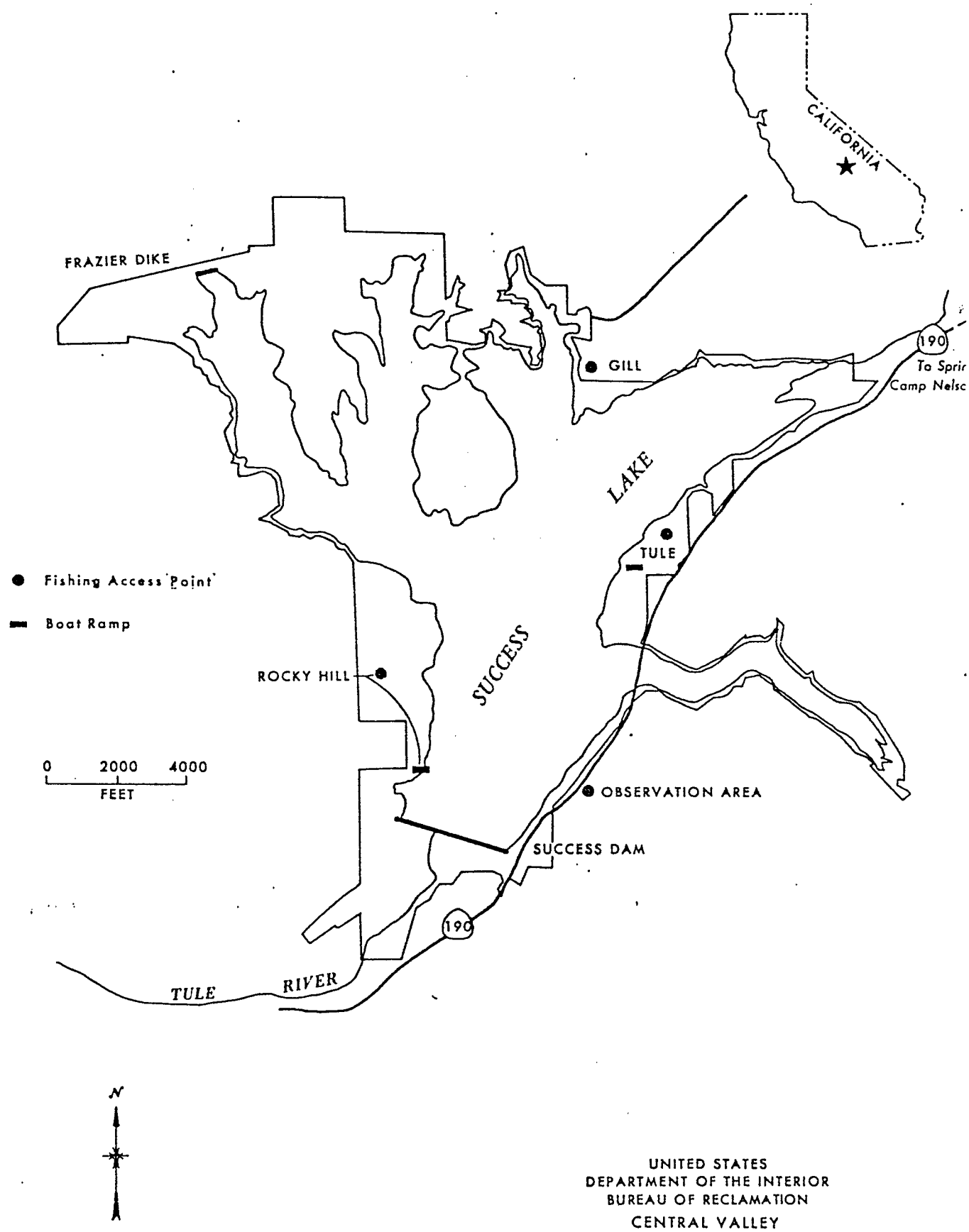
Success Lake (figure 39) is a popular facility receiving consistent use during the recreation season. It is also a small reservoir generally averaging under 1,000 surface acres during the recreation season. The Operations Branch of the Corps of Engineers estimates launching and mooring facilities are capable of placing more boats on the lake than the resource can safely handle. On holidays and peak weekends, boaters sometimes must wait to launch their boats. Since the resource is not capable of handling many more boats, future plans should address the control of boaters rather than the addition of new facilities.

Bank anglers do not have a problem accessing the shoreline, and no problem is expected to develop over the next 10 years. At low and medium pool level, parking is abundant. At high levels, parking lots sometimes fill, but no one is unable to find a spot to park and fish. If expansion is eventually deemed necessary and advisable, the terrain is quite flat, and additional parking could easily be provided.

Sanitation facilities are satisfactory. The shoreline is not steeply sloped, and the handicapped are able to drive right to the water's edge to fish.

The Tule River below Success Lake does not support a fishery of any note. Releases are not made for fishery maintenance, and the algae bloom is too heavy for most game fish.

Above the project, the middle fork of the Tule River is extremely accessible above Springville on Forest Service land and continues to be so right up to Camp Nelson (about 13 miles from Springville). The north



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SUCCESS LAKE

FIGURE 39

fork is an "artificial flies" only stream receiving more pressure in its upper reaches than DFG would like. Access below Milo is being improved by the DFG to encourage increased harvesting from the river and is considered adequate.

WHISKEYTOWN LAKE

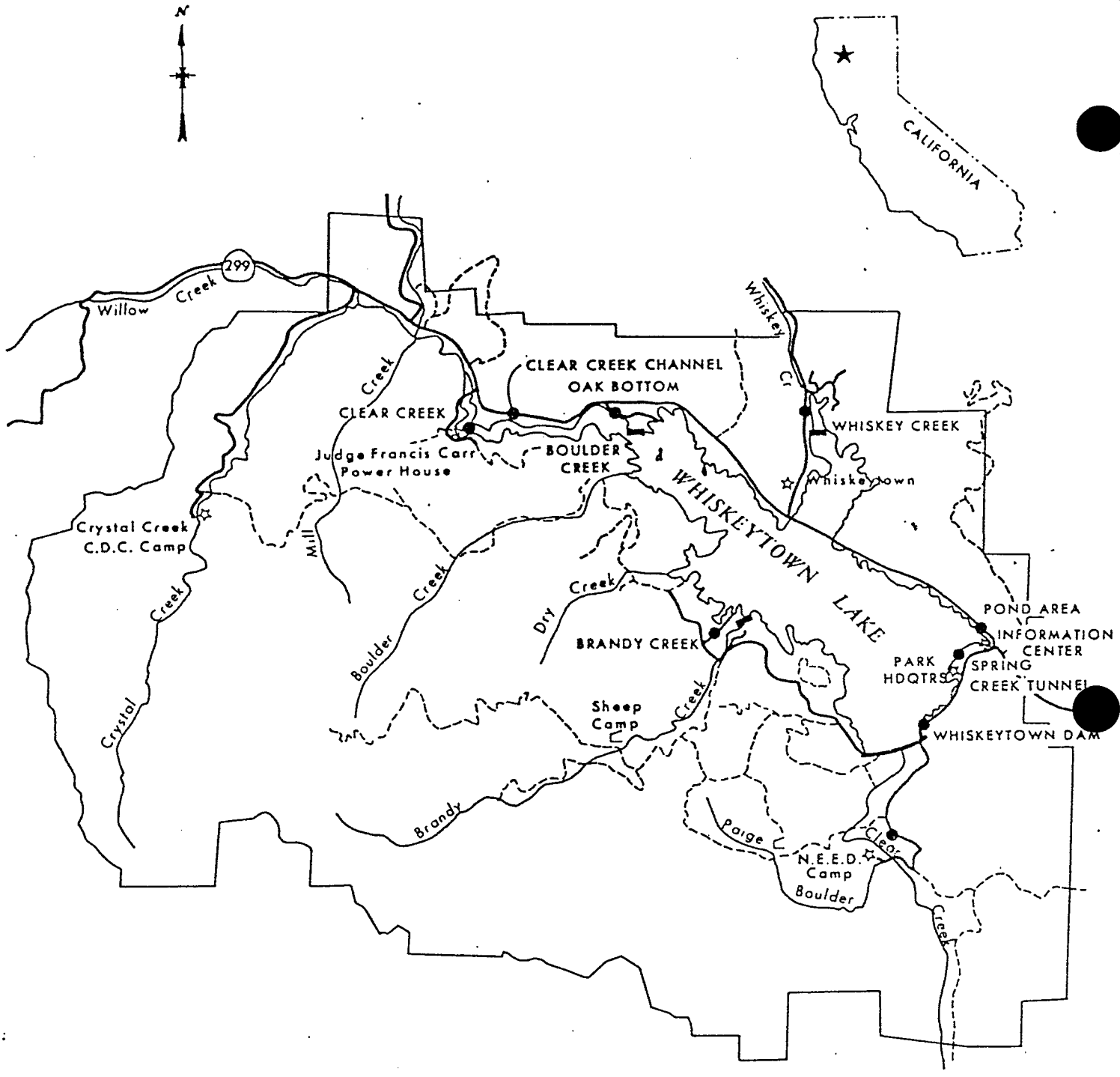
Whiskeytown Lake (figure 40), managed by the National Park Service, is maintained at a relatively stable water level by the Bureau of Reclamation. However, that level, even though stable, has not been at an optimum level. A matter of a few feet severely impacts those recreation facilities and fish spawning areas developed at precise levels. At times, low lake levels have kept kokanee salmon from reaching spawning beds in the Whiskey Creek area and boat launching is difficult.

Boat launch ramps are hazardous at an elevation of 1,197 feet and out of the water at 1,195 feet at Whiskey Creek and Oak Bottom. When these ramps are unusable, traffic must be rerouted to the ramp at Brandy Creek. This places a severe strain on the Brandy Creek facility and does not allow Whiskeytown Lake to operate up to its capacity at lower water elevations. Assuming an ability to maintain all ramps throughout the recreation season, launching facilities are considered adequate through 1990.

Spawning past a culvert in the Whiskey Creek arm can be maintained by levels no lower than 1,198 feet or by alteration of the culvert.

Whiskeytown is a multiuse lake receiving heavy use. Shore fishing is heaviest in the Carr Powerhouse area due to the flow attraction to planted trout. To meet the demand anticipated in the next 10 years, use at Carr and other heavy use areas must be dispersed.

The Whiskey Creek day-use area receives heavy summer pressure. Dispersion of shore use might be improved by providing more parking along existing roads and additional trails from the area through the largely manzanita-covered shoreline.



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WHISKEYTOWN LAKE

FIGURE 40

Streams entering and leaving Whiskeytown Lake are on park property for distances ranging from about 1 mile (Whiskey Creek) up to 6 miles (Crystal Creek). They are paralleled by roads and trails providing good access. Trout are planted by the DFG in Clear Creek below the dam and in the spring in Clear Creek above the reservoir. No additional stream access is needed. The DFG has traditionally planted fish at the Carr Powerhouse area. The rationale is that the fish, no matter where planted, will migrate toward the flows in this area anyway and fish planted near the powerhouse are harvested at a higher rate. Since anglers are aware of plantings and congregate at the planting site, varying the sites could encourage dispersion of anglers who follow plantings.

The Park Service plans to provide courtesy docks for handicapped anglers in the near future. These docks are to be included at the Oak Bottom and Brandy Creek sites.

CANALS

Canals, being single-purpose recreational opportunities, are not subject to the same planning difficulties that beset reservoirs. They have tremendous fishery potential and largely have been underutilized. Concentrations of fish equivalent to up to 50 tons of fish per mile may exist in certain reaches of canals which are not annually dewatered or heavily treated with herbicides. There is, however, little research data available on which to base plans for recreational development of those canals.

Canals traverse the Central Valley, touching a cross section of geographic, economic, and social areas. They offer recreation potential to people who in many cases cannot afford to travel to established recreational waters. Development of canals for fishing access requires a minimum of additional facilities, planning for which is not complicated by other recreational uses. The canals are currently equipped with buoys, lines, and escape ladders at various intervals due to required safety regulations for maintenance workers. Proper fencing and sign posting would be required, however, before the fishing potential could be developed. If legal and safety issues are resolved, thousands of visitor days of use are almost instantly available.

Development of canals for fishing access must consider basic operations policies. Present policies of operators of existing canals stress security and public safety near all canal structures. Unfortunately, fishing is generally best near those structures that alter flow (i.e., headgates, siphons, and pumping plants in particular). In addition, some canals are treated periodically with herbicides to control aquatic weeds.

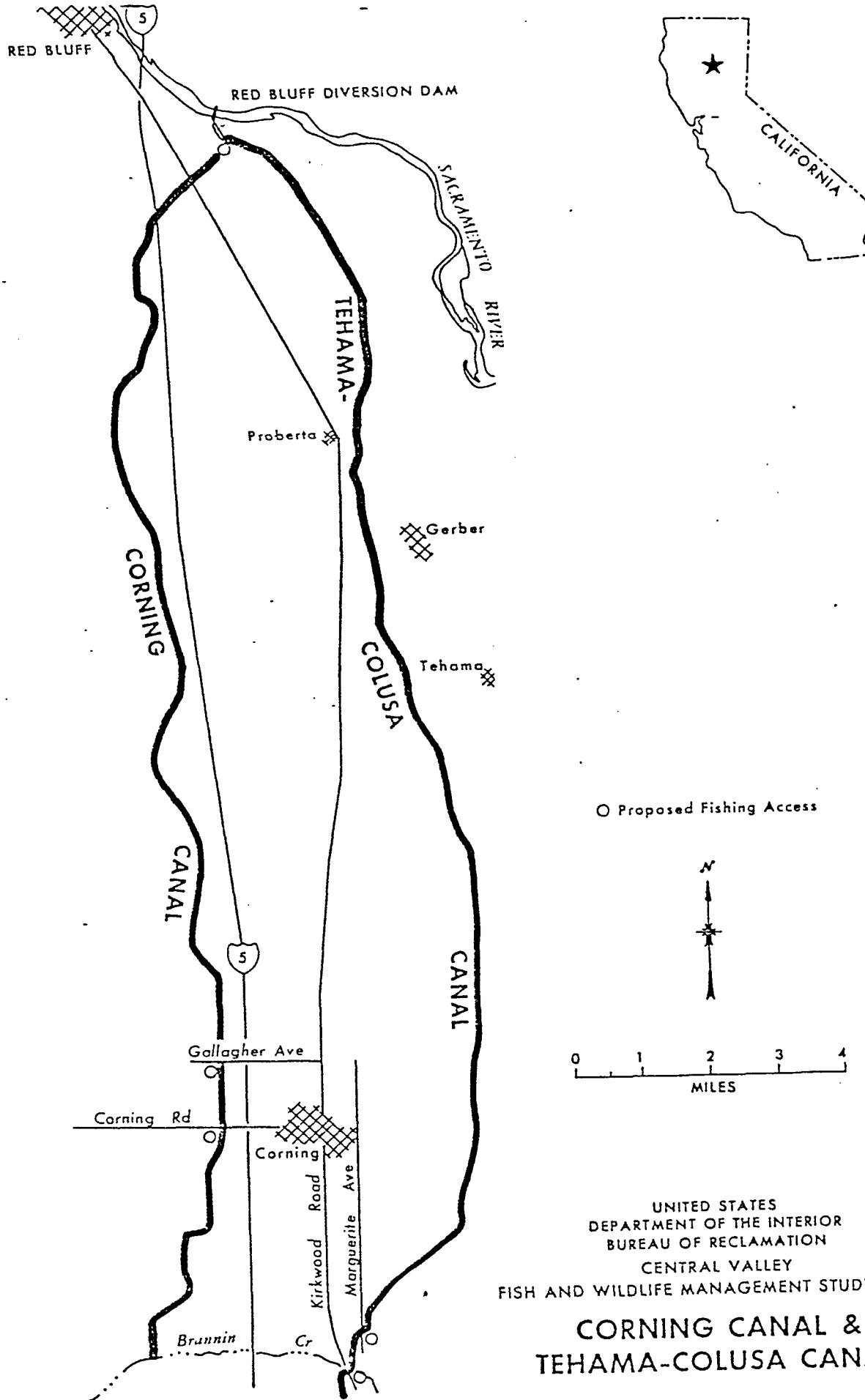
Generally, these herbicides are detrimental to fish populations. The conflicts between operational needs and the needs of anglers must be resolved before action to establish new access sites can be taken.

The DFG identified six Central Valley canals having viable fisheries and receiving significant use. The canals are: the Corning, Tehama-Colusa, Cross Valley, Folsom South, Delta-Mendota, and California Aqueduct. Due to the great distances involved and the sparcity of developed access sites, individual canal fishing access inspections, comparable to the reservoir site investigations, were not made. Rather, actions listed are based on observations of DFG field personnel. In future studies, each canal should be considered separately. Canal design, angler demand, fish populations, safety, security, herbicide use, and operational policy should be considered for each canal individually.

Canals Without Fishing Access Sites

Though the six canals potentially could provide hundreds of miles of fishing "streams," the Corning, Tehama-Colusa, Cross Valley, and Folsom South canals have no established fishing access sites. DFG officials proposed the following actions for these four canals:

Canal	Provisions for access
Corning	At the south side of Corning Road or Gallagher Avenue (figure 41).
Tehama-Colusa	At the Kirkwood Road crossing or at the south end of Marguerite Avenue, south of Corning (figure 41).
Cross Valley	No access.
Folsom South	At the White Rock Road crossing or at the Jackson Road (State Route 16) crossing, Sacramento County (figure 42).



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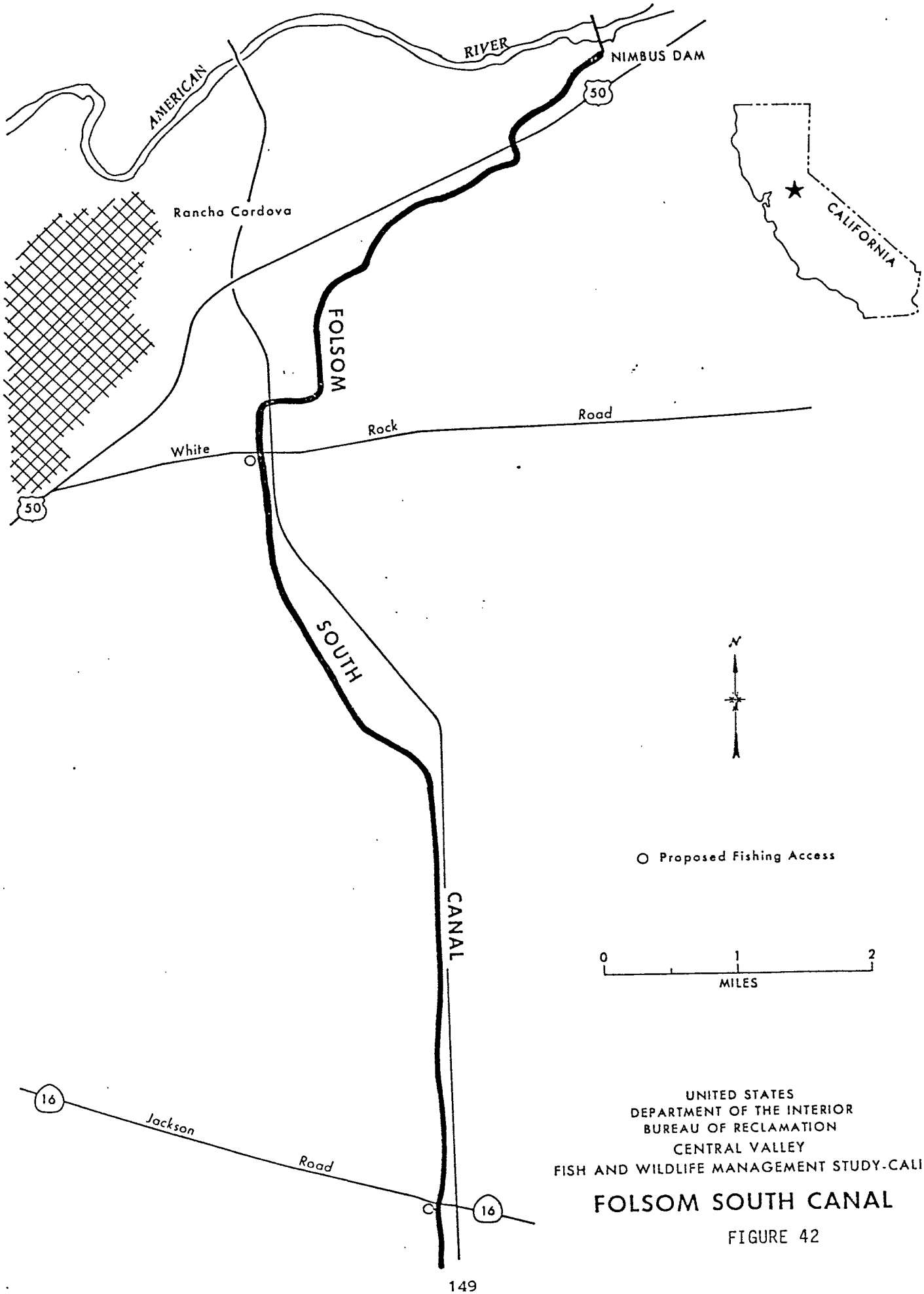
CORNING CANAL & TEHAMA-COLUSA CANAL

FIGURE 41



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FOLSOM SOUTH CANAL

FIGURE 42

Though fish populations are abundant, the Folsom South Canal has no legal fishing access. Considering the access opportunities at Folsom Lake and Lake Natoma, provision of canal fishing access should take priority over further development of reservoir access opportunities.

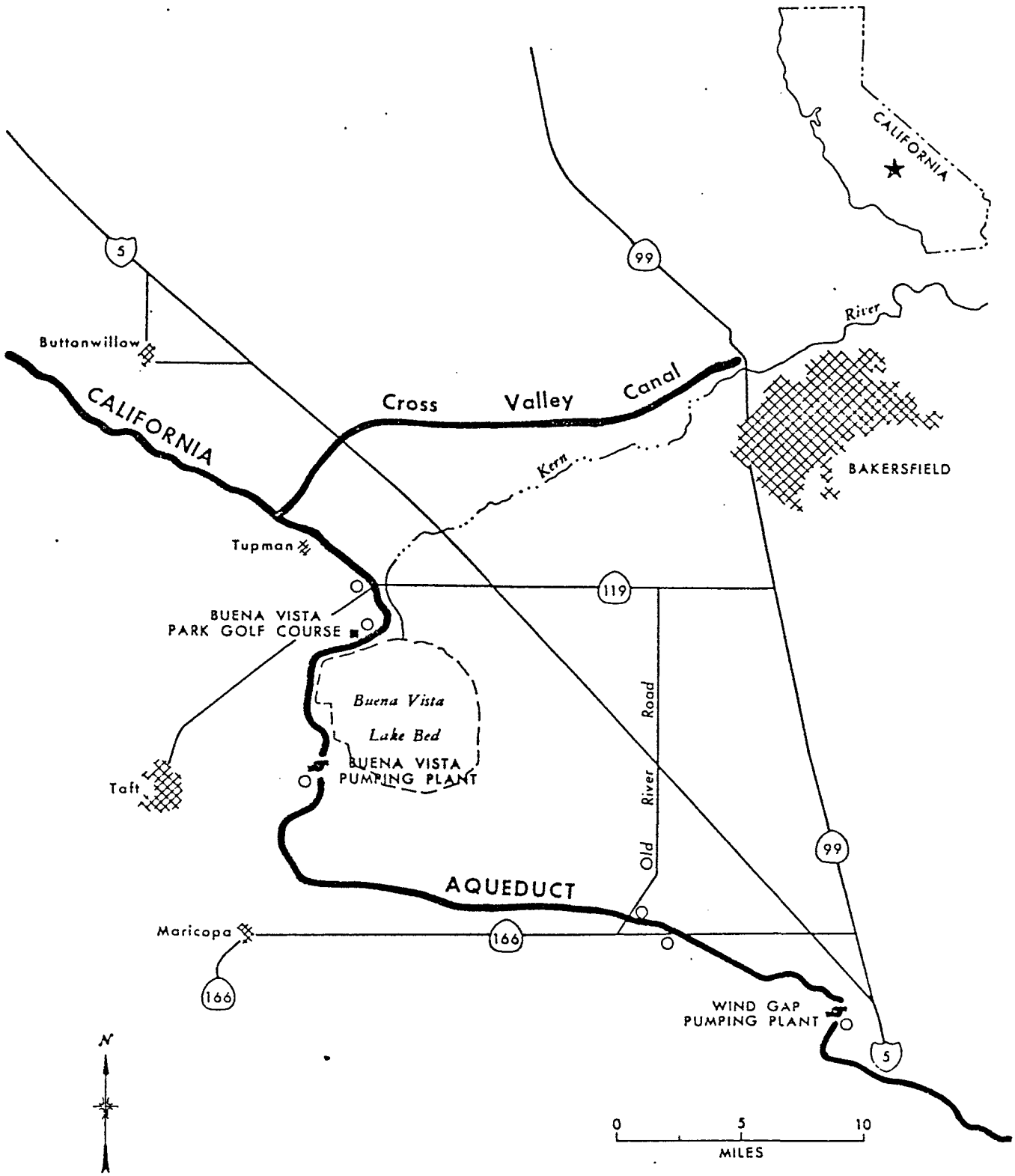
Canals With Fishing Access Sites

Established fishing access sites exist on the Delta-Mendota Canal and California Aqueduct. Use data on the fishing access sites are unreliable. Over 100 miles of the Delta-Mendota Canal are open to fishing. However, in many cases, the public has disregarded established sites in favor of others considered more promising, sometimes in areas posing safety problems. Locked areas of the canal, including check structures and siphons, are the most popular areas. Some existing fishing access sites have not been properly maintained because continued misuse and vandalism have made maintenance too expensive. These problems will have to be resolved before added access sites are developed.

Virtually all of the California Aqueduct is open to angling, but there is a lack of facilities such as parking areas and restrooms. Similar safety problems mentioned for the Delta-Mendota Canal also exist on the California Aqueduct. Fishing access facilities have been constructed and are operating successfully on the California Aqueduct. Three of the facilities, in Fresno and Kings Counties, for example, are the Huron, Three Rocks, and Avenal Cut-Off fishing access areas. These facilities are used intensively by local anglers and are administered by the counties. Potential sites identified by the DFG in Kern County (figure 43) include:

- Route 119 Crossing
- Golf Course Road Crossing
- Below Buena Vista Pumping Plant
- Route 166 or Old River Road Crossing
- Below Wind Gap Pumping Plant

Some locations (e.g., below Buena Vista pumping plant, Kern County) reflect the desire of anglers to access previously restricted structures. If no safe fishing access opportunities can be found at these areas, overpasses would be desirable. Several require very little development. In most cases, a section of lowered fence (4 feet), a parking area, and restrooms (portable) are all that are necessary. Development, depending on parking area availability, should be relatively inexpensive. The real problem is finding a managing agency willing to operate and maintain them.



O Proposed Fishing Access

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CALIFORNIA AQUEDUCT & CROSS VALLEY CANAL

FIGURE 43

PART V

RESOURCE CAPABILITIES AND PROBLEM SOLUTIONS

The actions discussed in Part IV for resolving the fishing access problems identified at major Central Valley water project facilities are listed in table 22 for reservoirs and associated streams and in table 23 for canals.

RESERVOIRS AND STREAMS

The 59 actions from table 22 were placed into one of three priority levels, depending upon the nature of the action. The priority levels are:

Priority	Actions required
1	To alleviate or prevent resource damage and/or health and safety problems, or to improve clearly deficient access opportunities.
2	To improve marginal access opportunities or those in a state of decline.
3	To improve access opportunities to an optimum condition.

A total of 29 priority 1 actions, 12 priority 2 actions, and 18 priority 3 actions are listed. In addition, 11 of the priority 1 actions are further designated to be critically important and should be resolved as soon as possible.

CONCEPTUAL SITE PLANS

From the 29 priority 1 actions, nine represented opportunities to provide access at sites where no previous plan had been developed. For each site, a conceptual plan was developed, along with cost estimates and impacts.

Table 22. Summary of actions required to improve fishing access sites at project reservoirs

Reservoir area (name of dam if different from reservoir)	Managing agency	Actions required	Priority group
1. Antelope Lake	U.S. Forest Service	- None	—
2. Black Butte Lake	U.S. Corps of Engineers	- None	—
3. Dorris Reservoir	U.S. Fish and Wildlife	- Renovate South Shore launch ramp	2
4. East Park Reservoir	U.S. Bureau of Reclamation	- Establish signing and barrier control for parking areas	1
		- Upgrade sanitation to flush or saniflush units at boat ramp sites	3
		- Investigate possibility of a drinking water source	1
		- Construct West side concrete boat ramp	1
		- Construct East side concrete boat ramp	1
5. Englebright Reservoir	U.S. Corps of Engineers	- Acquire 3 acres above headquarters	1
		- Reserve more day-use parking at headquarters	2
		- Develop trail from headquarters around to point west of Joe Miller Marina area	2
		- Consider Rice's Crossing for day-use with vehicular access	3
6. Folsom Lake	California Department of Parks and Recreation	- Implement master plan improvements which will optimize fishing access opportunity and quality	2,3
7. Frenchman Lake	U.S. Forest Service	- None	—

Table 22. (Continued)

Reservoir area	Managing agency	Actions required	Priority group
8. H. V. Eastman Lake (Buchanan Dam)	U.S. Corps of Engineers	- Within 3 years provide overflow parking on planned marina site below Monument Ridge	*1
		- Explore, with Water District, possibility of maintaining fishery flows on Chowchilla River	3
		- Consult Cal. Assoc. for the Physically Handicapped to determine need for improved access at West bank area	3
9. Hensley Lake (Hidden Dam)	U.S. Corps of Engineers	- Refurbish haul road for handicapped and aged	2
		- Develop parking and facilities on Road 400 access site	*1
10. Jenkinson Lake (Sly Park Dam)	El Dorado Irrigation District	- Implement Master Plan to acquire two inholdings	3
		1 - Forest Service inholding North of Arrowhead	—
		2 - Private parcel north of Pine Cone	—
11. Keswick Reservoir	Shasta County Water District	- Develop fishing access area at base of Bureau of Reclamation access road	1
		(a) parking	
		(b) sanitation	
		(c) signing and barriers	
		(d) trail to shore	
		(e) remove concrete refuse	
		- Repair water pump at existing boat ramp	2
12. Lake Berryessa (Monticello Dam)	U.S. Bureau of Reclamation	- Complete signing and barrier control at southeast and west side pullouts	1
		- Provide portable sanitation units along southeast and west shores	1
		- Upgrade sanitation to flush units at the Visitor Center	3
		- Upgrade sanitation to saniflush units at Eticuera	3
		- Development of the Pope Creek area	1

* Indicates critically important actions.

Table 22. (Continued)

Reservoir area	Managing agency	Actions required	Priority group
13. Lake Davis (Grizzly Valley Dam)	U.S. Forest Service	- Construct boat ramp at Camp Five Area	2
14. Lake Isabella	U.S. Corps of Engineers	- Acquire land in Robinson Cove area to prevent private development	1
15. Lake Kaweah (Terminus Dam)	U.S. Corps of Engineers	- Implement Master Plan improvement of Lemon Hill Recreation area	*1
		- Implement Master Plan improvement of Kaweah Recreation area	*1
16. Lake Natoma (Nimbus Dam)	California Department of Parks and Recreation	- Implement master plan improvements which will optimize fishing access opportunity and quality	2,3
17. Lake Oroville	California Department of Parks and Recreation	- Acquire 7 acres from PG&E above Parrish Cove	*1
		- Investigate possibility of handicapped/aged floating access pier at Oroville Dam	3
		- Develop Saddle Dam Access	*1
18. Lake Red Bluff	U.S. Bureau of Reclamation	- Provide camping facilities for overnight salmon fishermen	3
		- Provide barrier control and signing to prevent indiscriminate vehicular use	1
		- Plant more trees for summer shade	3
19. Millerton Lake (Friant Dam)	California Department of Parks and Recreation	- Acquire North Shore parcel	*1
		- Acquire South Shore parcel	*1
		- Through agreement with Bureau of Reclamation, open Friant Dam Overlook fro night fishing under State Park management	3
		- Establish medium and low level parking areas with sanitation	1
		- Implement agreement to maintain the river access from North Fork Road	1

* Indicates critically important actions.

Table 22. (Continued)

Reservoir area	Managing agency	Actions required	Priority group
20. New Hogan Lake	U.S. Corps of Engineers	- Install fish ladder at Stockton Water District weir on Calaveras River	3
		- Explore possibility of obtaining land parcels on Calaveras River	2
		- Acquire lands inside West county road and/or implement zoning restrictions	*1
		- Chip seal or oil access road north of observation area	2
		- Regrade and chip seal road in Fiddleneck day-use area down to waterline	2
21. New Melones Lake	U.S. Bureau of Reclamation	- None	--
22. O'Neill Forebay	California Department of Parks and Recreation	- Asphalt road from San Luis Creek day-use area, north to head of lake	1
		- Asphalt Catfish Flat road along South Shore	2
		- Resurface (asphalt) entrance road from Route 33	2
23. Pine Flat Lake	U.S. Corps of Engineers	- Implement basic launch and parking facilities at either Windy Gap or Sycamore Creek for high water overflow	*1
24. San Luis Reservoir	California Department of Parks and Recreation	- Create pulloffs on either side of westbound lane of Route 152 at Cottonwood Bay Bridge	3
25. Shasta Lake	U.S. Forest Service	- Develop trail systems from camping and day-use areas to disperse use	3
		- Require fishing piers at concessionaire facilities	3
26. Stony Gorge Reservoir	U.S. Bureau of Reclamation	- Locate drinking water source	1
		- Install fish cleaning stations at both Fig Orchard areas	3
		- Develop Skipper's Point boat ramp	1

* Indicates critically important actions.

Table 22. (continued)

Reservoir area	Managing agency	Actions required	Priority group
27. Success Lake	U.S. Corps of Engineers	- None	—
28. Thermalito Afterbay	California Department of Water Resources and California Department of Fish and Game	- Develop boat ramp	1
29. Thermalito Forebay	California Department of Parks and Recreation	- None	—
30. Whiskeytown Lake	U.S. National Park Service	- Maintain water level during recreation and spawning season at 1,198 feet	*1
		- Create small access lot (15-20 cars) at end of Whiskey Creek Arm	3
		- Encourage dispersal of fishermen by varying DFG fish plantings	1

* Indicates critically important actions.

Table 23. Summary of actions required to improve fishing access sites at project canals

Canal	Managing agency	Actions required
Corning	Federal Government	- Provide access at south side of Corning Road or Gallagher Avenue.
Tehama-Colusa	Federal Government	- Provide access at Kirkwood Road crossing in Tehama County or at south end of Marguerite Avenue, Corning.
California Aqueduct	State of California	- In Kern County develop fishing access facilities: Below Buena Vista Pumping Plant Golf Course Road crossing Route 119 crossing Route 166 or Old River road crossing Below Wind Gap Pumping Plant
Delta-Mendota	Federal Government	- None
Folsom South	Federal Government	- Provide access at White Rock Road or Jackson Road crossing, Sacramento County
Cross Valley	Local	- None

Economic impacts were estimated using methods from Procedures for Evaluation of National Economic Development Benefits and Costs in Water Resources Planning (Level C) as outlined by the Water Resources Council. For further details concerning procedure or value criteria, see subpart K of volume 44, No. 242, of the Federal Register, December 14, 1979 (Also, see appendix D).

Table 24 shows construction costs, operation and maintenance costs, and annual visitation for the nine chosen sites. Calculations of operation and maintenance costs are detailed in table 25.

Additional information on the nine sites selected for development is included in the discussion section under the respective project headings in Part IV, Analyses. That information includes conceptual site plans, economic analyses, and environmental quality impact summary sheets.

ECONOMIC ANALYSIS

The results of the economic analysis, based on fiscal year 1981 costs and monetary benefits, of the nine conceptual site plans are summarized in table 26. Benefits to the Nation, costs of site development and continued operation, and net benefits are expressed on an annual basis. The "without" alternative was not specifically addressed in the economic analysis since the present condition at the sites listed in Appendix D, either did not have facilities currently located at the site, or the present project recreational use was minimal. The benefit-cost analysis was based on information presented on page 200 of the report "Dollar Value Scoring - Unit Value Method, Water Resources Council." The

Table 24. Summary of actions requiring extensive development of new facilities

Reservoir area	Managing agency	Actions required	Priority group	Construction costs	O&M costs	Annual visitation
East Park Reservoir	Bureau of Reclamation					
West Side		Develop launching area and parking site	1	$160,000	$ 6,000	8,000
East Side		Develop launching area and parking site	1	$225,000	$19,000	25,000
Stony Gorge Reservoir	Bureau of Reclamation	Renovate Skipper's Point boat launch	1	$245,000	$26,000	34,500
Hensley Lake	Corps of Engineers	Develop parking and facilities at Route 400	1*	$160,000	$14,000	18,500
Keswick Reservoir	Shasta County Water District	Develop upper Keswick access	1	$109,000	$ 9,000	12,000
Lake Berryessa	Bureau of Reclamation	Develop Pope Creek day-use and fishing access site	1	$175,000	$18,000	24,000
Lake Oroville	California Parks and Recreation	Develop Saddle Dam access	1*	$155,000	$21,500	28,500
Thermalito Afterbay	California Water Resources and Fish and Game	Develop boat ramp	1	$490,000	$16,000	21,500
Millerton Lake	California Parks and Recreation	Develop river access at North Fork Road	1	$140,000	$ 5,000	6,500

*Those actions considered to be critically important.

Table 25. Calculation of annual visitation and O&M costs for nine development sites

Reservoir area	Number of parking spaces	Design days	People/Unit	Turnover	Annual visitation	O&M costs at 75 cents/visitor day
East Park Reservoir						
West Side	23	90	3	1.25	8,000	$ 6,000
East Side	75	90	3	1.25	25,000	$19,000
Stony Gorge Reservoir	92	100	3	1.25	34,500	$26,000
Hensley Lake	55	90	3	1.25	18,500	$14,000
Keswick Reservoir	40	80	3	1.25	12,000	$ 9,000
Lake Berryessa Pope Creek	35	150	3	1.5	24,000	$18,000
Lake Oroville	40	120	3	2.0	28,500	$21,500
Thermalito Afterbay	58	100	3	1.25	21,500	$16,000
Millerton Lake	20	90	3	1.25	6,500	$ 5,000

Table 26. Results of economic analysis of conceptual plans

Plan	Benefits($)	Costs($)	Net benefits($)	Benefit/cost ratio
East Park Reservoir				
West Side Launch	28,000	18,000	10,000	1.6 to 1
East Side Launch	91,000	36,000	55,000	2.5 to 1
Stony Gorge Reservoir	120,000	44,000	76,000	2.7 to 1
Hensley Lake	62,000	26,000	36,000	2.4 to 1
Keswick Reservoir	38,000	17,000	21,000	2.2 to 1
Lake Berryessa	78,000	31,000	47,000	2.5 to 1
Lake Oroville	96,000	33,000	63,000	2.9 to 1
Thermalito Afterbay	74,000	52,000	22,000	1.4 to 1
Millerton Lake	22,000	15,000	7,000	1.5 to 1
Total	609,000	272,000	337,000	2.2 to 1

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values indicated on this page represent a net increase in visitation usage. Current or projected use "without" facilities are interpreted as either zero or a positive integer. In cases where a positive factor was calculated, it has been subtracted from the gross future visitation figure. Therefore, data presented simply represents actual "net" benefits. See appendix D for scoring used in computing unit day values for benefit estimation. Annual net benefits (at 7 and 3/8 percent interest over 100 years) from nine sites would be $342,000, and the benefit-cost ratio would be 2.2 to 1.

ENVIRONMENTAL QUALITY

The effect of development would be an increase in quality in most categories, with a decrease in others. Improvement would result mainly from stabilization of erosion and physical damage caused by indiscriminate use in inappropriate manners and locations. Quality loss would result from replacement of open, natural habitat, and also from negative impacts due to increased use.

PART VI

FINDINGS AND CONCLUSIONS

The following findings and conclusions have been drawn from the study results.

FINDINGS

(1) Demand for access to fishing waters will continue to increase and existing sites will not be sufficient to meet that demand with an experience of acceptable quality to the majority of anglers.

(2) Canals are a largely underutilized fishing resource whose potential should be developed. Currently, developed fishing access facilities are minimal, considering the hundreds of miles of canal shoreline available.

(3) The study revealed that, due to subdivision and development, fishing access opportunities along streams are in the greatest danger of being lost when compared to lake and canal access opportunities.

(4) Expanding populations near water projects are placing increasing pressure on existing facilities and are competing for control of adjacent lands which have historically been used by anglers to access fishing waters.

(5) Fishery resources are capable of handling increased angling pressure if that pressure is distributed over appropriate sites.

(6) There is considerable potential for improvement of access opportunities through modification of existing sites and development of new sites through fee acquisition, easement, zoning changes, and a variety of other means.

(7) Staged extension of current facilities together with development of new facilities will ensure acceptable access to fishing waters for future anglers.

(8) Development of facilities for anglers may, in some cases, negatively impact the environment and, in other cases, be necessary to protect it. The development of a parking lot, for instance, may adversely impact open space and ecological systems. A parking lot at another site, however, may reverse severe soil erosion caused by indiscriminate driving and parking.

(9) Without action, access opportunity will remain reasonably good at some locations, deteriorate slightly at others, and become severely limited at others. The appropriate actions are listed in tables 22 and 23.

CONCLUSIONS

Following analysis of compiled data, a total of 59 actions were listed in order of priority according to severity of need and the nature of the action required. These actions are summarized in tables 22 and 23. Three levels of priority were identified, thus allowing an incremental plan of development which provides flexibility and alternative levels of involvement. Depending on available funding, that involvement

could mean implementation of only actions having the highest priority level, the first two, or all three. They are:

Priority 1 - Those actions required to alleviate or prevent resource damage or health and safety problems, or to improve clearly deficient access opportunities.

* - Those actions considered to be critically important.

Priority 2 - Those actions required to improve marginal access opportunities or those in a state of decline.

Priority 3 - Those actions required to improve access opportunities to an optimum condition.

From the highest priority group, 11 actions were designated as critically important and requiring attention as soon as practicable. They are:

1. H. V. Eastman Lake (Buchanan Dam) - Within 3 years, provide overflow parking at planned marina site below Monument Ridge.
2. Hensley Lake - Develop parking and access facilities at Road 400 access site.
3. Lake Kaweah (Terminus Dam) - Implement master plan improvement of Lemon Hill Recreation Area.
4. Lake Kaweah (Terminus Dam) - Implement master plan improvement of Kaweah Recreation Area
5. Lake Oroville - Acquire 7 acres from PG&E above Parrish Cove.
6. Lake Oroville - Develop Saddle Dam access area.
7. Millerton Lake (Friant Dam) - Acquire north shore parcel.
8. Millerton Lake (Friant Dam) - Acquire south shore parcel.

9. New Hogan Lake - Acquire lands inside West county road and implement zoning restrictions.
10. Pine Flat Lake - Implement basic launch and parking facilities at either Windy Gap or Sycamore Creek for high water overflow.
11. Whiskeytown Lake - Maintain water level during recreation and spawning season at 1,198 feet.

In addition, nine drawings are submitted to illustrate conceptually what could be done concerning those actions for which no plan currently exists.

Finally, suggestions concerning possibilities for further studies are made and a procedure for acquiring more reliable information on access needs in the future is provided.

PART VII

ITEMS FOR FURTHER STUDY

Recreation use statistics desirable for quantifying fishing access demand and opportunities could not be developed due to study constraints. Following are procedures which should be followed in future studies for determining with greater accuracy the adequacy of existing fishing access sites and the potential needs of anglers:

RESERVOIRS

1. Conduct a user survey.

Because anglers share facilities with other day users, it is necessary to determine what percentage of day users they comprise. Only with this information can current use by anglers be computed with any accuracy. The use survey also can be tailored to provide an opportunity for public input in the planning of future facilities.

2. Determine present and ultimate capacities for anglers.

In order to determine what is needed, the opportunity which currently exists must be determined first. Present capacity for fishing can be computed by utilizing the data gained in the user survey and by applying professional capacity standards to existing facilities and the physical resource. This will require a comprehensive inventory of existing facilities and a detailed analysis of resource components.

Of equal importance is the ultimate carrying capacity or "allowable-use-intensity" of the resource to support angler use. Regardless of demand, development should not be allowed to proceed to levels which threaten resource integrity and visitor experience. Consequently, all limiting factors must be identified and ultimate use limits established so that development does not exceed the potential of the resource.

3. Conduct a demand analysis.

A demand analysis applied to each project will produce statistics representing present and future demand for total recreation. Data from the user survey will aid in the conversion of that total recreation demand to demand for fishing.

Use of the demand analysis tool will help gain a region wide perspective permitting comprehensive development planning. The determination of demand at any one project, using this tool, involves consideration of recreation opportunity at surrounding projects. Consequently, all projects are indirectly connected, and demand data are a reflection both of an individual project's potential and the impact of others.

4. Determine deficiency of existing fishing access sites.

Capacity can be compared with present and future demand to determine existing or potential deficiencies. The resulting deficiencies, expressed as "deficient angler days of use" can be used to compute what facilities are required to offset the deficiency.

5. Coordinate with existing master plans.

Once fishing access needs have been identified, a determination should be made whether facility deficiencies should be solved through modification of existing access sites or the development of new sites. Applicable master plans should be reviewed with project area managers to determine those development alternatives which conform with the master plan. Generally, proposals for fishing access sites should not contradict master plans.

Possible site plans may be found in the master plan which can fulfill identified access needs. If not, attempts should be made to meet access needs with the least possible divergence from the basic master plan. Close contact and communication must be achieved with managing agency personnel to insure that the basic directions of the original master plan are not diverted.

This procedure is one method by which fishing access problems may be identified and solved. Its methodology provides the means for quantifying capacity and demand, as well as deficiencies. However, since this information represents people, a somewhat unpredictable lot, the resulting statistics must be scrutinized by trained professionals in the recreation field. Judgment, experience, and an esthetic appreciation of the resource, coupled with a knowledge of visitor likes and dislikes, are the basis for refinements leading to final decisions.

CANALS

Canals, being single-purpose recreational opportunities, are not subject to the same planning difficulties that beset reservoirs. They have tremendous fishery potential and largely have been under-utilized. There is, however, little research data available on which to base plans for their recreational development.

Canals traverse the Central Valley, touching a cross section of geographic, economic, and social areas. They offer recreation potential to people who in many cases cannot afford to travel to established recreational waters. Development of canals for fishing access requires a minimum of additional facilities, planning for which is not complicated by other recreational uses. If legal and safety issues are resolved, thousands of visitor days of use are almost instantly available.

Further study concerning canal utilization by anglers is needed. Without reliable data on which to draw, planners will not be able to tap a readily available resource, which could ease the recreation pressure on other water projects. Some issues that require review before advantage can be taken of potential fishing in canals include:

- Questions of liability
- Revision of safety standards
- Authorization requirements
- Coordination with Department of Fish and Game
- Use of herbicides
- Ability of canals to provide favorable habitat for food cover and reproduction.

In addition to canal access problems, basic operations and maintenance policies should be examined for possible revision. Whether irrigation districts are supportive of such changes should be assessed. Present policies of operators of existing canals stress security and public safety near all canal structures. Unfortunately, fishing is generally best near those structures that alter flow (i.e., headgates, siphons, and pumping plants in particular).

Obviously, fishing accesses located at overpasses would be preferable from a canal operator's viewpoint. Whether anglers would be satisfied with such access is another matter which requires further research. It is concluded that:

1. Policies concerning public presence near canal structures should be reviewed to determine if fishing access is compatible with check structure operation.

2. Policies concerning the use of herbicides should be reviewed to determine if fishery resources can be spared detrimental impacts.

3. Access points proposed at overpasses should be tested on a trial basis. Such accesses should include provision for:

    a. Escape from a canal should someone fall in.

    b. Proper sign placement and fencing.

    c. Adequate parking.

    d. Adequate sanitation facilities.

STREAMS

Streams of the Central Valley are far more vulnerable to loss of access potential than are reservoirs and canals. Without the protection of take lines or reclamation zones, stream banks may be developed by private interests and posted to prevent public access.

Water projects have had a variety of impacts on streams both above and below the reservoirs. Many projects have adversely affected fisheries while some have had positive impacts. Controlled releases regulating volume, temperature, and flow have, in some cases, improved downstream fisheries or created new ones. In some cases, habitat has been improved as streams once intermittent become perennial. Of the streams included in the study, many flow across private land. At one time, ranch land predominated and ranchers did not seriously oppose access to the streams on their property. Now, however, a good deal of that additional access opportunity as well as the new opportunities created by reservoir releases are threatened. As areas become more urbanized, ranch owners are less willing to authorize access to anglers. Also, flood plains have become attractive to developers. Housing development along the course of some rivers has completely prevented access for long stretches.

Because access on stream sections which now support viable or potentially viable fisheries is being eliminated, action should be taken before losses become pervasive and permanent. Further study will be necessary to find ways to prevent public lockout on water project tailwaters and headwaters. Issues requiring review are similar to those

listed for canals. In addition, land ownership patterns must be studied to uncover opportunities for acquisition or easement. Also, agencies qualified to manage potential sites must be located.

Some of the streams originating in and passing through water projects in the Central Valley also pass through or near population centers. Officially designated access is the only guarantee that anglers will be able to utilize streams that flow across private land. Fishing potential exists and further study may disclose opportunities to ensure access that would otherwise be denied.

APPENDIXES

A. Reservoir Group Lists

B. Fishing Access Opportunities Questionnaire

C. Central Valley Fish Zonation

D. Monetary Benefit Values - Water Resources Council

E. Millerton Lake Acquisition Proposals

Appendix A

RESERVOIR GROUP LISTS

Group 1 Reservoirs:

Reservoirs owned and operated by the Bureau of Reclamation

Name of reservoir (name of dam if different from reservoir)	Reservoir area (acres)	County	Stream
East Park Reservoir	1,820	Colusa	Little Stony Creek
Folsom Lake	11,450	El Dorado, Placer, Sacramento	American River
Jenkinson Lake (Sly Park Dam)	640	El Dorado	Sly Park Creek
Keswick Reservoir	640	Shasta	Sacramento River
Lake Berryessa (Monticello Dam)	20,700	Napa	Putah Creek
Lake Natoma (Nimbus Dam)	540	Sacramento	American River
Lake Red Bluff	530	Tehama	Sacramento River
Millerton Lake (Friant Dam)	4,900	Fresno Madera	San Joaquin River
New Melones Lake	12,500	Calaveras, Tuolumne	Stanislaus River
O'Neill Forebay	2,250	Merced	San Luis Creek
San Luis Reservoir	12,700	Merced	San Luis Creek
Shasta Lake	29,500	Shasta	Sacramento River
Stony Gorge Reservoir	1,275	Glenn	Stony Creek
Whiskeytown Lake	3,250	Shasta	Clear Creek

Group 2 Reservoirs:

Reservoirs owned and operated by other Federal agencies

Name of reservoir (name of dam if different from reservoir)	Agency	Reservoir area (acres)	County	Stream
Black Butte Lake	CE	4,560	Tehama, Glenn	Stony Creek
Dorris Reservoir	FWS	1,060	Modoc	Stockdill Slough
Englebright Reservoir	CE	815	Nevada, Yuba	Yuba River
H.V. Eastman Lake (Buchanan Dam)	CE	1,780	Madera	Chowchilla River
Hensley Lake (Hidden Dam)	CE	1,570	Madera	Fresno River
Lake Isabella	CE	11,400	Kern	Kern River
Lake Kaweah (Terminus Dam)	CE	1,945	Tulare	Kaweah River
New Hogan Lake	CE	4,410	Calaveras	Calaveras River
Pine Flat Lake	CE	5,970	Fresno	Kings River
Success Lake	CE	2,406	Tulare	Tule River

NOTE:

CE = Corps of Engineers

FWS = U.S. Fish and Wildlife Service

Group 3 Reservoirs:

Reservoirs owned and operated by the State of California
(Department of Water Resources)

Name of reservoir (name of dam if different from reservoir)	Reservoir area (acres)	County	Stream
Antelope Lake	890	Plumas	Indian Creek
Frenchman Lake	1,470	Plumas	Little Last Chance Creek
Lake Davis (Grizzly Valley Dam)	4,000	Plumas	Big Grizzly Creek
Lake Oroville	15,500	Butte	Feather River
Thermalito Afterbay	4,550	Butte	Trib. Feather River
Thermalito Forebay	600	Butte	Trib. Cottonwood Creek

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Group 4 Reservoirs:

Reservoirs owned and operated by all other parties both public and private

Name of reservoir (name of dam if different from reservoir)	Owner	Reservoir area (acres)	County	Stream
Raker (Big Dobe North)	Robert L. Schluter	1,600	Modoc	Trib. Rattlesnake
Thomas (Big Dobe South)	Robert L. Schluter	800	Modoc	Trib. Rattlesnake
Big Sage	Hot Spring Valley ID	5,270	Modoc	Rattlesnake Creek
Bowman Lake (Bowman Rockfill)	Nevada ID	825	Nevada	Canyon Creek
Bucks Lake (Bucks Storage)	PG&E	1,827	Plumas	Bucks Creek
Buena Vista	J. G. Boswell Co. & Tenneco West, Inc.	24,000	Kern	Kern River
Buena Vista	County of Kern	980	Kern	Kern River
Butt Valley	PG&E	1,600	Plumas	Butte Creek
Camanche	EBMUD	7,700	San Joaquin	Mokelumne River
Camp Far West	South Sutter Water District	2,680	Placer	Bear River

Group 4 Reservoirs:

Reservoirs owned and operated by all other parties both public and private (continued)

Name of reservoir (name of dam if different from reservoir)	Owner	Reservoir area (acres)	County	Stream
Caples Lake	PG&E	620	Alpine	Trib. Silver Fork
Cherry Valley	City-County S.F.	1,765	Tuolumne	Cherry Creek
Clear Lake Impounding	Yolo County Flood Control Water Conservation District	43,000	Lake	Cache Creek
Courtright	PG&E	1,480	Fresno	Helms Creek
Crane Valley Storage	PG&E	1,165	Madera	N. F. San Joaquin
Don Pedro	Turlock and Modesto ID	12,960	Tuolumne	Tuolumne River
Florence Lake	South California Edison Co.	962	Fresno	S. F. San Joaquin
Huntington Lake 1	South California Edison Co.	1,441	Fresno	Big Creek
Ice House	SMUD	678	El Dorado	S. F. Silver Creek
Mountain Meadows (Indian Ole)	PG&E	5,800	Lassen	Hamilton Creek
Indian Valley	Yolo Co. Flood Control & Water Conservation District	4,000	Lake	Trib. Cache Creek

Group 4 Reservoirs:

Reservoirs owned and operated by all other parties both public and private (continued)

Name of reservoir (name of dam if different from reservoir)	Owner	Reservoir area (acres)	County	Stream
Iron Canyon	PG&E	510	Shasta	Cedar Salt Log Creek
Jackson Meadows	Nevada ID	1,030	Nevada	Middle F. Yuba River
French Meadows (L. L. Anderson)	Placer Co. Water Agency	1,418	Placer	Middle F. American
Lake Almanor	PG&E	28,257	Plumas	N. F. Feather River
Lake Eleanor	City-County S.F.	948	Tuolumne	Eleanor Creek
Lake Fordyce	PG&E	696	Nevada	Fordyce Creek
Lake Spaulding	PG&E	624	Nevada	S. F. Yuba River
Lake Yosemite	Merced ID	500	Merced	Trib. Merced River
Little Grass Valley	Oroville-Wyandotte ID	1,433	Plumas	S. F. Feather River
Loon Lake	SMUD	1,450	El Dorado	Gerle Creek
Lower Bear River	PG&E	746	Amador	Bear River
Lower Hell Hole	Placer Co. Water Agency	1,250	Placer	Rubicon River
Mammoth Pool	South California Edison Co.	1,100	Fresno	San Joaquin River

Group 4 Reservoirs:

Reservoirs owned and operated by all other parties both public and private (continued)

Name of reservoir (name of dam if different from reservoir)	Owner	Reservoir area (acres)	County	Stream
McBrien	Amanda Hagge	700	Modoc	Pit River
McCloud	PG&E	520	Shasta	McCloud River
Medley Lakes	PG&E	627	El Dorado	Trib. S. F. American
Dallas Warner (Modesto)	Modesto ID	3,800	Stanislaus	Trib. Tuolumne River
Bullards Bar (New Bullards Bar)	Yuba Co. Water Agency	4,810	Yuba	North Yuba River
Lake McClure (New Exchequer)	Merced ID	7,127	Mariposa	Merced River
Hetch Hetchy (O'Shaughnessy)	City-County S.F.	1,960	Tuolumne	Tuolumne River
Pardee	EBMUD	2,134	Amador	Mokelumne River
Payne	Charles E. Massae	526	Modoc	Trib. S. Fk. Pit River
Lake Britton (Pit No. 3)	PG&E	1,265	Shasta	Pit River

Group 4 Reservoirs:

Reservoirs owned and operated by all other parties both public and private (continued)

Name of reservoir (name of dam if different from reservoir)	Owner	Reservoir area (acres)	County	Stream
Regional Waste Water Control Oxidation	City of Stockton	574	San Joaquin	Trib. San Joaquin River
Lower Roberts (Roberts)	Big Valley Mutual Water Co.	640	Modoc	Trib. Pit River
Rollins	Nevada ID	825	Nevada	Bear River
Salt Springs	PG&E	925	Amador	N. F. Mokelumne River
Salt Springs Valley	Rock Creek Water District	920	Calaveras	Rock Creek
Scotts Flat	Nevada ID	720	Nevada	Deer Creek
Shaver Lake	South California Edison Co.	2,177	Fresno	Stevenson Creek
Silva Flat	Roger J. Laplant, Jr., et al.	815	Lassen	Juniper Creek
Silver Lake	PG&E	510	Amador	Silver Fork
Sly Creek	Oroville-Wyandotte ID	562	Butte	Lost Creek
Spooner	R. W. Akers	635	Lassen	Trib. Ash Creek
Moon Lake (Tule Lake)	R. W. Akers	2,650	Lassen	Cedar Creek

Group 4 Reservoirs:

Reservoirs owned and operated by all other parties both public and private (continued)

Name of reservoir (name of dam if different from reservoir)	Owner	Reservoir area (acres)	County	Stream
Tulloch	Oakdale-South San Joaquin ID	1,260	Calaveras	Stanislaus River
Turlock Lake	Turlock ID	3,260	Stanislaus	Trib. Tuolumne River
Union Valley	SMUD	2,860	El Dorado	Silver Creek
Lake Thomas A. Edison (Vermillion Valley)	South California Edison Co.	1,890	Fresno	Mono Creek
Merle Collins (Virginia Ranch)	Browns Valley ID	975	Yuba	Dry Creek
West Valley	South Fork ID	1,050	Modoc	West Valley Creek
Wishon	PG&E	1,000	Fresno	N. F. Kings River
Woodward	South San Joaquin ID	2,427	Stanislaus	Simmons Creek
Beardsley	Oakdale-South San Joaquin ID	650	Tuolumne	N. F. Stanislaus River

FISHING ACCESS OPPORTUNITIES QUESTIONNAIRE

NAME OF RESERVOIR: _____

In the boxes to the right, list all areas consistently used as access points for fishing, regardless of design or desirability. Check appropriate boxes below:

	AREA OR LOCATION	AREA OR LOCATION	AREA OR LOCATION	AREA OR LOCATION
TYPE OF FISHING ACCESS				
Shore				
Boat				
Both				
IDENTIFY INTENDED USE OF EACH				
Campground				
Picnic Area				
Rest Area				
Scenic Turnout				
Marina				
Boat Launching Area				
Swimming Area				
Roadside Parking				
General Access Lot				
Designated Fishing Access Site				
Other (Explain)				
UTILIZATION OF AREA'S FISHING ACCESS CAPABILITY				
Low Use				
Moderate Use				
Capacity Use				
Slight Overuse				
Heavy Overuse				
SUITABILITY FOR FISHING ACCESS				
Unsuitable for the following reason(s):				
Interferes with intended use				
Unsafe				
Is causing resource damage				
Adequate parking unavailable				
Other (Explain)				
Essentially suitable but needs:				
Safety equipment				
Landscaping				
Sanitation facilities				
Increased Parking				
Boat Launching				
Fish cleaning station				
Nothing needed				
Other (Explain)				
SPECIAL PROVISIONS FOR HANDICAPPED ACCESS				
Not Available				
Available (Explain)				

COMMENTS:

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Appendix C

Central Valley Fish Zonation

Typical mid-elevation reservoirs may be divided into four ecological zones, as follows (from Moyle, pp. 25-28 and 33-34):

The Littoral Zone occurs along the reservoir edges, down to the depth of light penetration or to the upper limits of the thermocline, whichever comes first. It is the zone most severely affected by fluctuations in water level, since large areas may alternately be flooded or exposed in a relatively short period of time. Despite the fluctuations, large numbers of fish are found here. Bluegill, largemouth bass, and golden shiners live close to the water's surface near shore during part of the year. Mosquitofish stay in the flooded grass in very shallow areas. Brown bullheads, white catfish, and carp stay close to the bottom. Black crappie cluster around submerged boulders and logs during the day, moving out into the open water to feed on plankton and fish in the evening. Reproduction is a problem for most of these species because a sudden drop in water level may expose a nest of eggs and a sudden rise can submerge it to unfavorable depths.

The Epilimnetic Zone occupies the well-lighted, well-oxygenated surface waters away from shore and above the thermocline. Its fish fauna is perhaps the most variable from reservoir to reservoir. Since its primary means of supporting fishes is its abundant zooplankton, it contains three main types of fish: (1) plankton-feeding larvae of Littoral Zone fishes, especially bluegill and other centrarchids;

(2) plankton-feeding adult fishes; and (3) fishes that prey on the plankton feeders. Threadfin shad are perhaps the most common permanent plankton-feeding residents of the Epilimnetic Zone despite the fact that they were not introduced into the Central Valley until 1959. Other zooplankton grazers which may occupy this zone, mostly in reservoirs that lack threadfin shad, are hitch, delta smelt (Japanese subspecies), Mississippi silversides, and, in Millerton Lake, American shad. Striped bass are assuming the role of chief epilimnetic predator in a number of reservoirs although their inability to spawn in most reservoirs means that they have to be planted on a regular basis. Fish from other zones also prey on epilimnetic fish, especially those that venture close to shore.

The Hypolimnetic Zone occupies the cold (less than 20 °C) water below the thermocline in the deep reservoirs that stratify during the summer months. The main inhabitants are rainbow trout, which often enter the epilimnion in the evening or night to feed on whatever forage fish are most abundant. Kokanee salmon are also commonly present but they stay in the cold depths in the summer months feeding on zooplankton.

The Deepwater Benthic Zone is on the bottom, below the thermocline and usually below the limits of light penetration. It is the one zone in which native fishes, especially prickly sculpin and Sacramento sucker, may predominate. White and channel catfish also may live in this zone but they usually move up into the Littoral Zone to feed at night.

It should be emphasized that the fish zones described for reservoirs are present primarily during the summer months and even then they may be disrupted by extreme drawdowns of the reservoirs. Species also move freely among the zones, probably because of the instability of the habitat.

Streams associated with water projects in the Central Valley hold fish populations which are essentially determined by habitat. The environmental requirements of different species restrict their occurrence to zones of similar characteristics. These faunal zones, described by Moyle, are consistent and recognizable, and are arranged in belts paralleling the major mountain ranges surrounding the valley.

The lowest zone covers the valley floor and is dominated by species introduced by man; largemouth bass, white and black crappie, bluegill, threadfin shad, American shad, striped bass, white catfish, brown bullhead, carp, and goldfish. Natives and other introduced species are present in small numbers. Study streams falling completely or partly in this zone include: Stony Creek, American River, San Joaquin River, Putah Creek, Pope Creek, Chowchilla River, Fresno River, Calaveras River, Kings River, Tule River, Kaweah River, and Yuba River.

Portions of some of the above-mentioned streams, as well as the remainder of those studied, cross through at least one of three additional zones:

Squawfish-sucker-hardhead Zone. Most of the streams inhabited by the fishes of this zone have average summer flows of 300 or more liters per second (10 ft^3/s), deep rocky pools, and wide, shallow riffles (Moyle and Nichols, 1973). Some of the streams, however, may become intermittent in the summer or at least have such reduced flow that the fish are confined to the pools. Summer water temperatures typically exceed 20 °C and fluctuate with air temperatures in smaller streams. In the Sierra foothill streams of the San Joaquin Valley, the Squawfish-sucker-hardhead Zone occupies a narrow altitudinal range, from about 27 to 450 m above sea level. The range appears to be much wider in streams of the Sacramento Valley foothills.

Sacramento squawfish and Sacramento suckers are usually the most abundant fishes in the zone. Hardhead are largely confined to the zone but their distribution is irregular. Where they are found, however, they are abundant. Other native fishes that may live here are tule perch, speckled dace, California roach, prickly sculpin, and rainbow trout. In recent years, introduced species (especially smallmouth bass, largemouth bass, green sunfish, mosquitofish, carp, white catfish, and channel catfish) have become increasingly common. In the San Joaquin Valley, the zone is sharply separated from the zones above and below it, largely because of low summer flows. In the more permanent streams of the Sacramento Valley, however, species replacement is not so much the rule as is species addition. Thus, rainbow trout live in the zone in the larger and colder streams. Many anadromous fishes (mainly chinook

salmon, steelhead rainbow trout, white sturgeon, and Pacific lamprey) have major spawning grounds in this zone. Newly hatched salmon and sturgeon drift downstream into an Estuarine Zone but young steelhead spend a year or more in the streams. Pacific lamprey spend the entire 5 to 7 years of the ammocoetes stage of their life cycle in muddy backwaters, migrating downstream only when they metamorphose into the predaceous adult stage.

California Roach Zone. Streams characteristic of this zone are small warm tributaries to larger streams and flow through open foothill woodlands of oak and digger pine. In the San Joaquin Valley, these streams are located in a narrow altitudinal band in the foothills of the Sierra Nevada. Since streams are usually intermittent during the summer, the fish are confined to stagnant pools that may exceed 30 °C during the day. During winter and spring the streams are swift and subject to flooding. The main permanent native residents are California roach. Due to their small size and tolerance of low oxygen levels and high temperatures, they can survive where most other fishes cannot. In many areas, the Roach Zone is now dominated by green sunfish or, occasionally, fathead minnows. Green sunfish have apparently replaced California roach in some areas, such as tributaries to the upper San Joaquin and Fresno Rivers.

During the winter and spring, anadromous fishes, especially steelhead rainbow trout, may use these streams for spawning. The young

fish generally move out into larger streams before the Roach Zone streams dry up. Sacramento suckers, squawfish, and native minnows also commonly use these streams for spawning. If the pools are sufficiently large and deep, their young of the year will survive the summer in them.

Rainbow Trout Zone. This zone is found in clear headwater streams where the stream gradient is high (usually a total drop of 3 m or more for every 1 km of stream reach). The water is swift and permanent with more riffles than pools. The water is also cold, seldom exceeding 21 °C, and is saturated with oxygen. The bottom material is predominately cobbles, boulders, and bedrock. The banks are well shaded and frequently undercut. Aquatic plants, submerged or emergent, are few except where the streams flow through boggy alpine meadows. The dominant native fish is rainbow trout but sculpin (usually riffle or Pit sculpin) and speckled dace are likely to be found in the lower portions of the zone. In some streams they may be joined by Sacramento sucker or California roach. In some stream sections of this zone, the rainbow trout has also been joined, through artificial introduction, by brook, brown, and golden trout.

Prior to the extensive planting programs of the late nineteenth and early twentieth centuries most streams and lakes of the high Sierras were fishless. The only major exceptions to this were the upper reaches of the Kern River where golden trout evolved and those tributaries to the Pit and McCloud Rivers that contained redband trout. The Rainbow Trout Zone has now been extended, through planting, to include most of the streams and lakes of the Sierras. The Rainbow Trout Zone has also been

greatly extended by man through the planting of fish in barren waters, the poisoning of marginal trout streams to eliminate nongame species, and by the construction of dams which have cold, permanent outflows. At lower elevations, the zone, or at least the dominance of trout, has been extended downstream into sections normally inhabited by fishes of the Squawfish-sucker-hardhead Zone, through poisoning operations followed by planting of hatchery trout. These extensions normally last only a few years, after which the treatment has to be repeated if the artificially large trout populations are to be maintained. Rainbow trout habitat also has been created at low elevations by cold waters flowing from dams. Often these waters, due to their low temperatures and swift currents, naturally exclude native minnows and suckers without further intervention by man.

Appendix D

Monetary Benefit Values - Water Resources Council

Unit Day Value Method for Estimating Recreation Benefits

The unit day value (UDV) method assigns a monetary value (benefit) for a recreational activity. By applying a carefully thought-out and adjusted unit day value to estimated use, an approximation is obtained that may be used as an estimate of project recreation benefits.

Recreation sites are assessed in terms of quality of recreational experience, relative scarcity, site development, accessibility, and esthetic factors (table K-3-2) and points assigned. Point values are converted to a monetary unit day value using revised table K-3-1 (FY 1981).

Dollar Value Scoring - Unit Value Method
Water Resources Council

Thermalito Afterbay	Stony Gorge Reservoir	Millerton Lake	East Park Reservoir (West Side Boat Launch)	East Park Reservoir (East Side Boat Launch)
4	8	4	10	10
3	8	2	9	9
13	13	12	13	13
18	14	18	14	14
18	16	16	17	18
56 points	59 points	52 points	63 points	64 points
(v=)$3.38	(v=)$3.47	(v=)$3.26	(v=)$3.56	(v=)$3.58

Lake Berryessa	Keswick Reservoir	Hensley Lake	Lake Oroville
4	4	4	4
3	3	3	3
11	13	13	13
18	14	18	18
18	16	16	16
54 points	50 points	54 points	54 points
(v=)$3.32	(v=)$3.20	(v=)$3.32	(v=)$3.32

	Visitation (No. of days)	x Dollar Value	= Benefit
Thermalito Afterbay	21,750	$3.38	$ 73,515
Stony Gorge Reservoir	34,500	3.47	119,715
Millerton Lake	6,750	3.26	22,005
East Park Reservoir (West Side Boat Launch	7,800	3.56	27,768
East Park Reservoir (East Side Boat Launch)	25,300	3.58	90,574
Lake Berryessa	23,625	3.32	78,435
Keswick Reservoir	12,000	3.20	38,400
Hensley Lake	18,600	3.32	61,752
Lake Oroville	28,800	3.32	95,616

Revised Table K-3 1 (FY 1981) - Conversion of Points to Dollar Values

Activity Categories	POINT VALUES										
	0	10	20	30	40	50	60	70	80	90	100
General Recreation (Points from Table K-3 2)	1.40	1.60	1.80	2.10	2.50	2.90	3.20	3.40	3.60	3.90	4.10
General Fishing & Hunting (Points from Table K-3 2)	2.00	2.20	2.40	2.60	2.90	3.20	3.50	3.70	3.90	4.00	4.10
Specialized Fishing & Hunting (Points from Table K-3 3)	9.50	9.80	10.00	10.30	10.50	11.50	12.50	13.40	14.40	15.40	16.30
Specialized Recreation Other than Fishing & Hunting (Points from Table K-3 3)	5.50	5.90	6.40	6.80	7.30	8.20	9.10	10.90	12.70	14.50	16.30

Note: See 44 FR 72963-64 (published December 14, 1979) for Table K-3-2 and K-3-3.

Table K-3 2 - Guidelines for Assigning Points for General Recreation

Criteria	Judgment Factors				
Recreation Experience	Two general activities 3/	Several general activities	Several general activities; one high quality value activity 4/	Several general activities; more than one high quality high activity	Numerous hig quality valu activities; some general activities
Total Points: 30					
Point Value:	0-4	5-10	11-16	17-23	24-30
b) Availability of Opportunity 7/	Several within 1 hr. travel time; a few within 30 min. travel time	Several within 1 hr. travel time; none within 30 min. travel time	One or two within 1 hr. travel time; none within 45 min. travel time	None within 1 hr. travel time	None within 2 hr. travel time
Total Points: 18					
Point Value:	0-3	4-6	7-10	11-14	15-15
c) Carrying Capacity 1/	Minimum facility development for public health and safety	Basic facilities to conduct activity(ies)	Adequate facilities to conduct without deterioration of the resource or activity experience	Optimum facilities to conduct activity at site potential	Ultimate facilities t achieve intent of selected alternative
Total Points: 14					
Point Value:	0-2	3-5	6-8	9-11	12-14
d) Accessibility	Limited access by any means to site or within site	Fair access poor quality roads to site; limited access within site	Fair access, fair road to site; fair access, good roads within site	Good access, good roads to site; fair access, good roads within site	Good access, high standar road to site; good access within site
Total Points: 18					
Point Value:	0-3	4-6	7-10	11-14	15-13
e) Environmental Quality	Low esthetic factors 5/ exist that significantly lower quality 6/	Average esthetic quality; factors exist that lower quality to minor degree	Above average esthetic quality; any limiting factors can be reasonably rectified	High esthetic quality; no factors exist that lower quality	Outstanding esthetic quality; no factors exis that lower quality
Total Points: 20					
Point Value:	0-2	3-6	7-10	11-15	16-20

1/ Value should be adjusted for overuse.
2/ Value for water-oriented activities should be adjusted if significant seasonal water level changes occur.
3/ General activities include those that are common to the region and that are usually of normal quality. This includes picnicking, camping, hiking, riding, cycling, and fishing and hunting of normal quality.
4/ High quality value activities include those that are not common to the region and/or Nation and that are usually of high quality.
5/ Major esthetic qualities to be considered include geology and topography, water, and vegetation.
6/ Factors to be considered in lowering quality include air and water pollution, pests, poor climate, and unsightly adjacent areas.
7/ Likelihood of success at fishing and hunting.
8/ Intensity of use for activity.

Millerton Lake Acquisition Proposals

October 31, 1978

T. A. Wilson
Superintendent
District 3 Headquarters

Opportunity Purchase
Fund
Keith Caldwell at
Dist. 3 Hqrs. Metin
2-Parcels Madera Cou

Millerton Lake Area (373)

A. 1. Parcel #1 Madera County R-21-E T-10-S Sec. 32 (Hayes Store).

This plot contains wide driveway between North Shore entrance sign and contact station. Justly or unjustly the department is assumed to be remiss in permitting this unsightly and unsafe area to remain in present condition.

2. It is developable for access to future planned facilities as; Boat Ramps, Marina, Day Use and Water Utility development.

It is an inholding because when the U. S. Bureau of Reclamation purchased land in this vicinity they used contour lines not meets and bounds. This parcel is above 520' contour generally.

See photos 1 - 4.

B. 1. Parcel #2 Madera County SE 1/4 of NE 1/4 T-10-SR21E Sec. 33

Area contiguous with access road, surrounded on three sides by park property. Campsite #1 adjoins property.

Purchase of this parcel would preclude, concessioners, entepreneurs building on the site.

Photos 5-6.

William J. Reinhardt
Area Manager

WJR:tb

Attachments
Map-Photos

November 6, 1978

T. A. Wilson
Superintendent
District 3 Headquarters

Inholdings No. 8
Madera County
Add'l. Info

Millerton Lake Area (37d)

Parcel #1 Madera County, located in SE 1/4 of NE 1/4 Sec. 32 R-21-E T-10-S Assessors parcel #051-164-006.

Areas 3 acres more or less.

Owner of record:

Diversified General Inc.
2220 Tulare St., Suite 904 (Del Webb Bldg.)
Fresno, CA 93721

This parcel with wide entrance driveway off entrance road 3/4 mile from park entrance has existing delapidated building on 75' X 225' flat native soil parking area. Most visitors assume it is state owned and controlled with high incidence of vandalism and roadyism. Commonly known as Hayes Store area.

Valuable addition to Area because:

1. Can be utilized as residence and storage yard.
2. Can be used as access to proposed launching and day use facilities, realignment of entrance area.

William Reinhardt

William J. Reinhardt
Area Manager

204

WJR:tb
cc: Bob Crawford w/attachments

C-064790

C-064790

O.E. Budget - Parcel #1 Madera County

$550.00 - 35 mandays remove and haul existing delapidated and unsafe building. Remove concrete slab. Collapse old septic tank and fill. Renovate parking lot.

Utilities electricity - 1 Flood light

$150.00

Fence: 75 lineal feet fence and gates $250.00

November 6, 1978

T. A. Wilson
Superintendent
District 3 Headquarters

Inholdings No. 5
Madera County
Add'l. Info

Hillerton Lake Area 378

Parcel #2 Madera County, located in SE 1/4 of NW 1/4 T-10-S R-21-E Sec. 33.

This inholding adjacent to main park access road (continuation of Highway 145) surrounded on three sides by existing U. S. Bureau of Reclamation leased land. This property is contiguous with campsite #2 at the entrance to Rocky Point Campground. The area is well landscaped with several Blue Oaks, Digger Pine and Chaparral.

Owner of record:

Diversified General Inc.
2220 Tulare St., Suite 904 (Del Webb Bldg.)
Fresno, CA 93721

Upon investigation, of Guisti Farms Inc.

Some years ago Guisti Farms planned to use this parcel for motel development in conjunction with adjacent proposed golf course. The development fell thru due to lack of water.

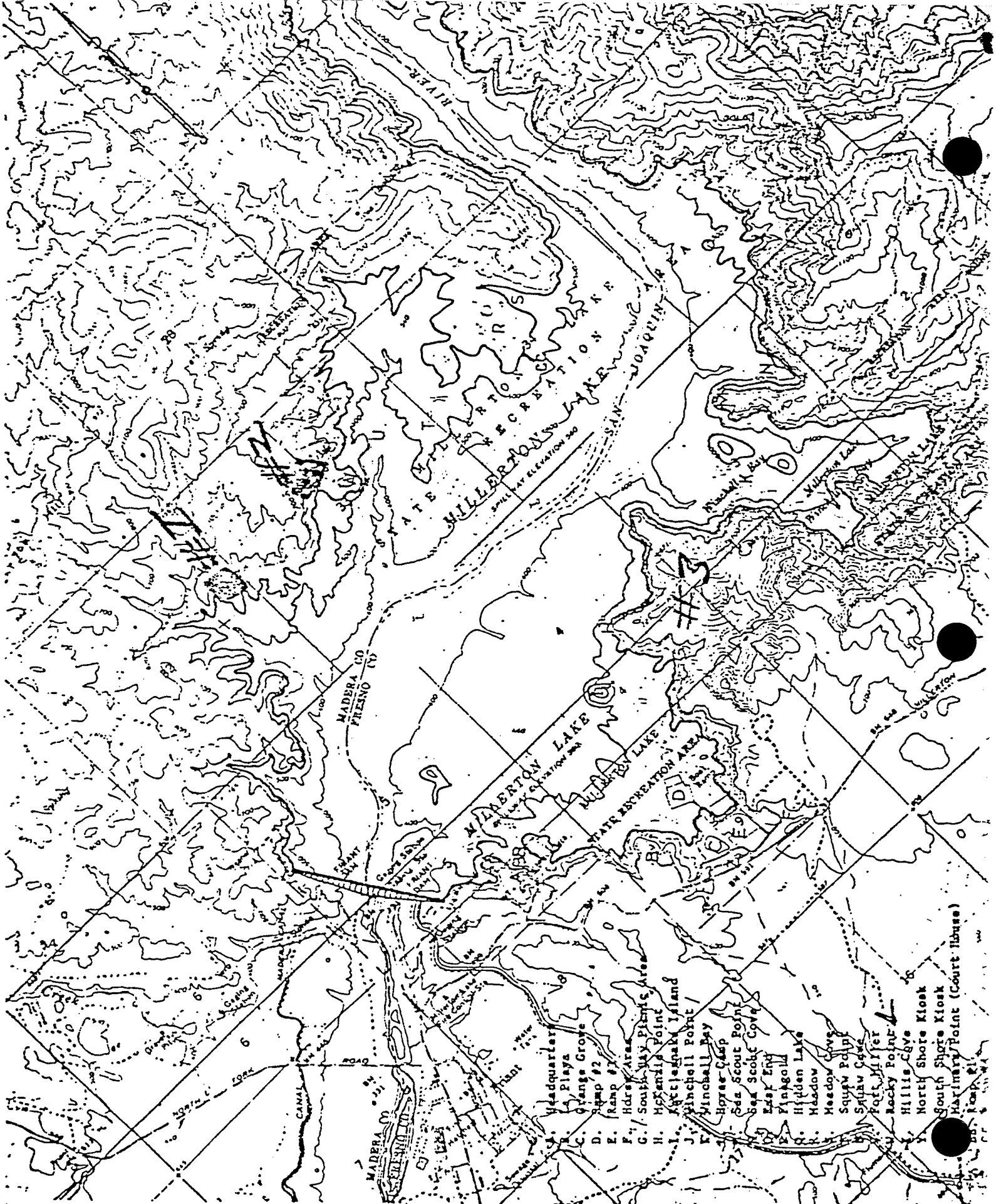
William J. Reinhardt
Area Manager

WJR:tb

cc: Bob Crawford
w/attachments

Parcel #2 - Madera County

No budgetary requirements at this time.


STATE RECREATION AREA
MILLERTON LAKE
SAN JOAQUIN RIVER
MADERA CO
FRESNO CO
Headquarters
A. Playa
B. Orange Grove
C. Ramp #2
D. Ramp #1
E. Horse Area
F. South Day Picnic Area
G. McKenzie Point
H. Rattlesnake Island
I. Winchell Point
J. Horse Camp
K. Sea Scout Point
L. Sea Scout Cove
M. Bear Trap
N. Pineapple
O. Hidden Lake
P. Meadow
Q. Meadow Cove
R. Squaw Point
S. Squaw Cove
T. Potts Miller
U. Rocky Point
V. Hills Cove
W. North Shore Kiosk
X. South Shore Kiosk
Y. Hartman Point (Court House)

C-064794

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